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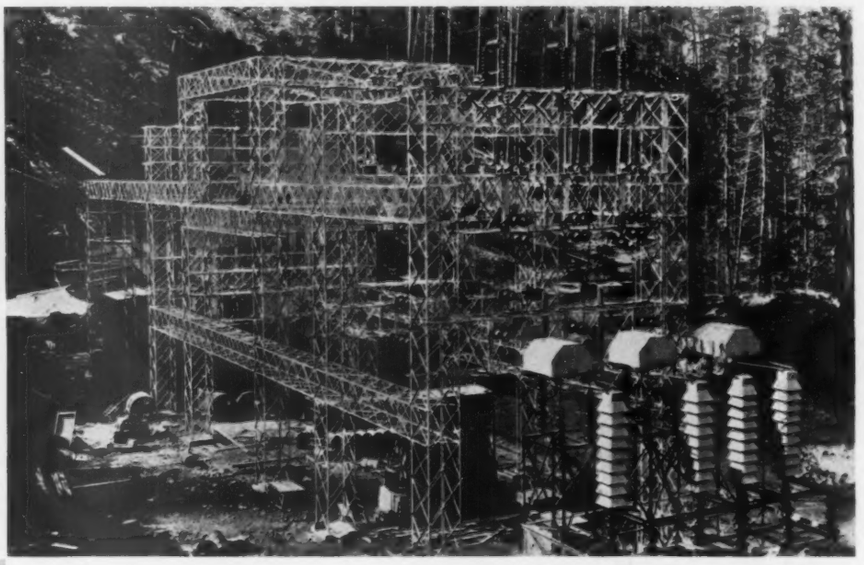

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ELECTRICAL WEST, entered as second class matter at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published at 883 Mission Street, San Francisco, California, thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1, and December 1.

ELECTRICAL WEST

With which are consolidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

A McGraw-Hill Publication
Established 1887

W. A. Cyr, *Associate Editor*
C. W. Leihy, *Associate Editor*
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G. C. Tenney, *Editor*

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Volume 66 | San Francisco, May 1, 1931 | Number 5

McGraw-Hill Company of California

833 Mission Street
SAN FRANCISCO

NORTHWEST OFFICE
1206 Spalding Building
PORTLAND, OREGON

SOUTHWEST OFFICE
632 Chamber of Commerce Bldg.
LOS ANGELES, CALIF

Publishers of

ELECTRICAL WEST

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WASHINGTON, National Press Building
CHICAGO, 520 North Michigan Avenue
PHILADELPHIA, 1600 Arch Street
BOSTON, 1427 Statler Building
CLEVELAND, 501 Guardian Building
ST. LOUIS, 1556 Bell Telephone Building
NEW YORK, 285 Madison Avenue
DALLAS, 303 Thomas Building
DETROIT, 2-257 General Motors Building
GREENVILLE, S. C., 1301 Woodside Bldg.

Subscription rate in the United States and possessions, Canada, Mexico and all countries included in the U. S. Postal Union, $2 per year, two years $3; elsewhere $3 gold (13 shillings), two years $5. Single copy, 25 cents. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Member Audit Bureau of Circulations
Associated Business Papers, Inc.
Circulation of this issue, 6,950

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All forged of copper-bearing steel Lapp Trunnion-Type Strain Clamp

WITH this new clamp it is now possible to have all hardware on the line of forged steel. Recognizing the advantages of forgings, Lapp has attempted to make Forged Steel available wherever possible. Starting with forged suspension insulator caps years ago, Lapp successively carried through the development of steel insulator fittings, not only of clevis design but of ball-and-socket as well; then the forged Trunnion-Type Suspension Clamp; and, now, Lapp All Forged Trunnion-Type Strain Clamp.

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ELECTRICAL WEST

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A McGraw-Hill Publication

San Francisco, May 1, 1931

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G. C. TENNEY, *Editor*

TIT FOR TAT would seem to be a tenet of the California Railroad Commission's policy. Once when utilities had hard sledding they were granted interim rate increases, now farmers having a hard time are granted similar rate decreases.

▼

"WHEN you can't stand competition, buy it out," is old stuff, but Seattle's councilmen, desirous of eliminating comparisons in utility operation, have introduced an ordinance to condemn the private utility properties. That city's street railway must give them courage, if nothing more.

▼

DESPITE a desperation for new sources of revenue to meet California's increasing state expenses, its legislators roughly turned down the idea that municipal utilities pay their share of taxes, thus upholding the ancient privilege of buying anything so long as someone else pays for it.

▼

SECRETARY WILBUR signed the contract dotted line for Hoover Dam, and the big job, hopefully estimated to require seven years, has begun.

▼

HARASSED by giddy legislation and sick industries, the Northwest utilities have decided to cancel their convention this year and confine their association work to section conclaves. Thus depression affects even the speech-making industry.

▼

LAST year it was vest-pocket golf which saved lighting for the rising generations. This year it promises to be any number of other outdoor sports which will take the not-too-tired business folk out in the open of an evening.

The Month

ELECTRIFYING their buildings to the limits of their faith, few power companies have had Southern California Edison's courage to go so far as to heat their business homes electrically throughout. This new headquarters building strikes many original and daring notes in commercial electrification practices. (See page 228.)

▼

THE industry has been saying, "Electricity is cheap, use more of it" to its customers, but how many in the industry have really known how cheap it is in comparison to other forms of domestic energy? An editor bares his domestic budget to public gaze for the cause. (See page 226.)

▼

WITH one experiment in merchandising bubbling away in Long Beach, Southern California Edison, always the pioneer researcher, has set up a new set of test tubes and cultures in its San Joaquin Valley division, seeking again the answer to dealer-power company merchandising problems. (See page 256.)

▼

ECONOMIC and technical changes are altering the face of contracting in spite of itself, and only the organizations which adjust themselves to the new order will survive. Both a city and a country shop are described in their methods of profitable adjustment. (See page 236.)

Editorial

Edison Building A Laboratory

ONCE in a lifetime the really appropriate thing is done. In contrast to the many times it is not done such an event always stands forth as something of a milestone. In the new Southern California Edison Company Building in Los Angeles the electrical industry sees this high type of achievement.

More than anything else, that company's new building typifies a courage in its convictions. The company believes in electricity and has used it in every practical way in its new home. It believes in electric heating, and the building is heated electrically and by a variety of systems so that each may be fairly tried, experienced, and thus developed. It believes in good lighting and has therefore used its very best practice in designing its own lighting. It believes in stability and quality, and its building is so sturdily built that neither earthquake nor tornado could harm it even should they shake it loose from its foundations.

Thus this building is more than an office building, more than the roof over the heads of hundreds of employees, the house in which company records and business contracts are stored. It is a living conviction. It says to the world, "See, our electricity gives us the finest of workshops. It provides us the most convenient and comfortable of edifices for our headquarters and its people. It gives us a living demonstration of those services we advise our customers to take unto themselves. It serves both as a means of showing what electricity can do when intelligently and fully used and as a real proof of its economy. Nothing has been included which has not met our own most exacting requirements."

If the building means all this to the Edison organization, then to the electrical industry as a whole its significance is even greater. Here under one roof is a practical electrical laboratory, an exhibition of electrical uses and applications more comprehensive than anything hitherto existent in southern California. Let the industry take advantage of this exhibit, use it as an example in convincing customers and prospects of the practicability of greater electrical service. Unquestionably, the Edison company will welcome such use.

From such an institution, housed in such a working laboratory of electrical uses, the industry can fully expect to see a personnel inspired by this example. In their own lives they will more readily use electricity for every task possible. In their business contacts they will convince their customers and friends because from the company headquarters itself down through every one of its officers and men and women there comes a universal voice, "We believe in it; we know, for we use it ourselves."

No Convention in the Northwest This Year

ANNOUNCEMENT that the Northwest Electric Light and Power Association, as an economy measure, will dispense with the general convention for this year has aroused much discussion. Many regret this action on the ground that it will have a bad psychological effect on the rank and file of the employees of the industry, who, just as they are beginning to be encouraged somewhat to look forward to better times with more confidence, need bright, cheerful, positive news rather than the opposite. Others fear the menace to the quality of association work such action appears to invite, in that, lacking the stimulating effect of a convention climax to the year's endeavors, workers may become discouraged and lose interest.

However, one should examine the reasons for the action before presuming to question its propriety. There is no doubt that executives in all lines of business are under tremendous pressure to curtail expenses. That the utility industry has been able to do this with a minimum of disturbance to the wage and employment situation is wholly commendable, and that it continue to do so is highly desirable. Those that are inclined to resent the passing of a convention should not forget that they and their associates farther down the line are still employed and at the same old wage—and this in the face of some none too bright facts. In recent months some of the companies in the Northwest have experienced for the first time in their entire existence a monthly gross earning less than that of the same month in the previous year. Further to aggravate the situation, the new taxation legislation in Oregon, Idaho, and Utah will make itself felt in the earnings statements of practically every operating company in the five states. There may be other factors and probably are, but with these as the foundation it is easy to see why a ready opportunity to make a tangible and comparatively painless saving for all was embraced.

The industry can best serve in the present instance by pledging support to the Northwest asso-

ciation in the future, to the end that there will be no lessening of effort which would tend to lower in any way the value that has accrued from its past work.

Radio to Build Public Relations

SO INTANGIBLE a medium as radio has been difficult to appraise. Just how far it can be made to develop an appreciable commercial effect has been the subject of much comment and speculation.

Yet it would appear from recent political events that if a message is presented correctly radio can become as good a publicity medium as newspaper advertising,—in many cases a better one. At least radio has the advantage of telling the story in a neutral medium and to a wide audience.

Since radio advertising in a sense is electrical, what is more logical than that it be chosen as a major publicity medium for the industry from which it has sprung? For actual selling of merchandise, except in some special lines, its virtues may not yet be altogether apparent. But for general publicity it has certain features of superiority over other available means.

One predominant necessity arises, however, from the very acceptance of such an idea. This is the necessity for careful thought about the audience and its reactions. Without such a study the proper pitch can hardly be given to the level of the program. Executives, to take an example, may feel inclined to want to sponsor only the dignified type of program which they and their own circle of friends prefer. They forget that the likes and dislikes of the vast audience they wish to reach with their message may be entirely different.

Because radio is a costly medium it becomes imperative that it be used efficiently. An ineffective, weak, or negative broadcast becomes the most extravagant of useless expenditures. Hence preparation of script and program cannot be left to the inexpert or inexperienced. The cost of the medium sets the standard and the price for the talent. The penalty for boredom is the turned dial, for which the deaf ear or cold silence of yesterday's public meeting is no match.

Certainly radio deserves intelligent use. It has enough to offer a belabored industry, constantly under fire and often misunderstood, to merit the pains needed to learn to speak through it. This precocious child may yet do much for its parent industry.

Picking Men for Agricultural Sales

POWER company executives responsible for development of agricultural load are not always in direct contact with the farming public. Instead, they must see and hear through the eyes and ears of their representatives. What should this type of man be? What should be his training and experience? Serious thought is needed on this subject, for poorly selected men already have done considerable harm to the cause of rural electrification.

Those familiar with the rural field realize that the electrical industry is dealing with a different type of individual in the farmer. He must be analyzed and his psychology understood before men of the proper type to contact him may be selected.

From 10 to 20 per cent of all farmers are said to be in the misfit or failure class and neither electric power nor the agricultural engineer can do much for them. Approximately 30 per cent of farmers are financially and intellectually independent. They operate on a large scale, using modern methods and machinery, and usually have competent assistance in technical matters. The vast army of average farmers who make up the balance are the ones in whom the central stations are principally interested.

Usually these are getting ahead slowly, or at least are holding their own. Most of them are suffering a great handicap because of lack of capital, education, and organization. It is with this group that the agricultural engineer should be able to do the most good and with whom he should spend perhaps 75 per cent of his time.

The successful agricultural sales engineer should learn to understand the psychology of the farmer. He should be able to listen sympathetically to the farmers' problems and realize their seriousness. He should be familiar with all types of farming in his community and should have had agricultural training and experience himself. He should be able to appear before farm groups and deliver a worthwhile message. He should have some sales ability. He should not assume the role of farm adviser or county agent. He should never be a census taker. In short, he should have the training, experience, and personality necessary to mix with this great mass of average farmers and assist them in solving their production problems with the aid of electricity.

If the right men are in the field and electric rates are such that the farmer can avail himself freely of electric service, rural electrification will advance at a rapid rate.

How *Cheap* Is Electricity?

Has the Industry Sold Its Wares Well Enough to Leave Its Customers With a Feeling That They Are Getting a Real Bargain? It Is a Worth-While Task

By BERKELEY SNOW
Northwest Editor, ELECTRICAL WEST,
Portland, Ore.

MUCH of the present agitation against the utility industry has been nourished in the erroneous belief that rates are too high and that electric service costs too much. If this is true, then it must also be true that the industry has failed to sell its service in the sense that the average merchant sells his goods. It has not left the buyer with the feeling that the cost has been much less than the worth. Could this feeling be implanted into the mind of the buyer of electric service, much of the clamor of the agitator would be wasted on unheeding ears and at least some of the troubles of the industry, as manifested in unfavorable results at the polls, would vanish.

While thinking of these things, it occurred to me to look into my own situation. I have always made a rather considerable use of electricity in my home, feeling about its value and usefulness just as we could hope everyone might feel about it. Yet I had never taken the trouble to analyze the situation closely for the purpose of determining whether my costs under a relatively large use of electric service were more than they would have been if I made little use of it.

An executive session with my "general manager" revealed that quite accurate accounts had been kept. A little figuring produced an amazing result. Because of the possible use that might be found for it by commercial and public relations departments, I do not hesitate to give currency to this analysis for what it may be worth.

In order to understand the analysis more completely, it will be necessary to acquaint you with the sort of establishment we maintain and with the part played by electricity in its operation. In the first place, there are four of us occupying what would be classified as an eight-room house. My wife does most of the work of housekeeping, though we maintain a maid in the house for a part of the year and we hire extra outside help for a portion of the heavier housework. We cook, heat water, refrigerate, wash, iron, sweep rugs and upholstery, and polish floors by electricity. We use no dishwasher nor kitchen-aid devices.

The house is heated by a warm air, oil-burning furnace, equipped with an electrically operated, thermostatically controlled draft fan in the top of the warm air chamber. House temperature is thermostatically controlled through the electrically operated oil burner. Our water heating is accomplished by a 1,000-watt heater on flat rate with a 1,000-watt booster heater on the meter. Incidentally, there is no gas pipe in the house. In the year under consideration, 1930, we made a little use of a portable electric air heater and for the last two months of the year had a radio. We have no electric clock and did not use a sun lamp.

Now our operating and maintenance costs and fixed charges for 1930 are accurately known. They are shown in Table I for all supplies and services affected by the use of electricity. I want to impress the point here that this table does not represent what can be done by electricity but what is *actually being done*. This table contains no theory; it is all fact, accurate fact.

TABLE I
1930 Costs for Home Supplies and Services Affected by the Use of Electricity

	(Actual cost to nearest dollar except as otherwise noted)
Electric service	$134.00
Fuel oil (at 0.0434 per gal.)	81.00
Laundry	36.00
Hired help in house (full time maid for part of the year and extra help)	166.00
Maintenance of equipment	20.00*
Interest on investment in electrical appliances, electrically-driven equipment including oil tank and extra wiring (6 per cent on $1,900)	114.00
Depreciation and obsolescence on same (10 per cent on electrically driven equipment and 5 per cent on oil tank and wiring)	177.00
	$728.00

* Estimated from memory.

To compare the cost of operating a home in this manner and the cost if substitutes for electric service were employed, it was found necessary to assume a set of conditions. In this assumption I felt it only fair to attempt as nearly as possible to reproduce our established standard of living, since if this were done this question could be eliminated from consideration and the cost data would be comparable without the necessity of placing a relative valuation on two unequal standards. It proved to be practically impossible to do this, however, since under any imagined conditions, contemplating a bare minimum use of electricity, my wife and I both agreed that living would be less comfortable and easy even though more help were hired and other compensating factors were introduced.

But the case assumed does approximate an equality in this factor, and I desire not to place undue emphasis on this point. I am afraid the industry has dwelt overmuch on this element of electrification and its implications, and has not dwelt enough on the simple dollar-and-cents element. This is a study in costs and not an essay on the joy of living with electricity, and it will stick to its subject.

Thus a set of conditions was assumed and the costs applicable under those conditions were estimated. In this estimation I have sought information from my wife, whose housekeeping experience includes also operating a home very largely without electrical help, and from purveyors of the goods and services involved, and I have used current prices. I have endeavored to be as conservative as possible in estimating quantities in order to avoid

laying myself open to the accusation that I have overstated the case in favor of electricity. Further, in the interest of simplicity, I have omitted some intangible items that are not readily reducible to dollars and cents.

In the assumed case, we would be using electricity for lights and radio; we would be cooking and heating water with gas; we would burn briquets in the furnace (manually stoked); we would send all the wash out to be returned laundered ready for use; we would use a good ice box and buy ice; and we would hire extra help to take care of the extra cleaning work entailed because of the use of hard fuel, the lack of a vacuum sweeper and electric floor polisher, returning to the use of a broom and rug beater and the old-fashioned floor polishing weight.

TABLE II

Estimated Costs Under Assumed Case of Supplies and Services Affected by the Use of Electricity, if This Use Were Confined to Lights and Radio Only

Electric service	$ 30.00
Briquets (estimated from experience, 10 tons at $14.75)	147.00
Gas for cooking and water heating (estimated by gas company and other data at $6 per month)	72.00
Laundry (estimated from experience $22.50 per month)	270.00
Ice (estimated from experience)	30.00
Food wastage (minimum estimate of refrigerator manufacturer)	60.00
Hired help (estimated from experience at $30 per month)	360.00
Maintenance of equipment	5.00
Interest on investment in ice box and gas range and water heater (6 per cent on $300)	18.00
Depreciation and obsolescence on same (10 per cent)	30.00
	$1,022.00

These tables show a saving in favor of operating my home electrically amounting to $294 per year, which has paid for my investment in electrical equipment, including oil-burning apparatus, in six and one-half years, and promises to leave me practically this amount in addition for application to other investments every year as long as I operate in this manner. We are asking "How cheap is electricity?" Well, in my case it has been so much cheaper than the other services I buy that a substantial application of it to running my home has increased my life insurance estate—because I divert the major portion of my savings to insurance—by $13,000. I hope my heirs will credit me with wisdom for investing in electrical appliances even though they may have cause to doubt the wisdom represented by some of the rest of the household inventory.

In order to clarify this entire analysis, I want to emphasize here that I do not claim electrical service can be sold on this basis, using this case or any other case as average. The condition set forth herein is not average. There is, in fact, no such person as "the average man," no home is "the average home," no family lives under "average conditions." A thousand and one factors bearing on each individual's situation introduce variables that upset average calculations. Averages are of little use beyond their value as a guide to setting up a proper measuring stick to fit an individual case.

This analysis happens to portray my own personal and individual case, but it is quite accurate as such, and if it introduces any new ideas in the approach to the question, "How cheap is electricity?"—then perhaps it will have served a truly useful purpose, even though it has required a "true confession" to do so.

▼ ▼ ▼

Far West Faces Serious Water Shortage in 1931

SURVEYS of water supply conditions in the Far West bring out the fact that a water shortage exists and that some of the states are confronted with serious situations. No power shortage should result, however, because ample steam generating facilities are available.

California faces a severe water shortage during 1931, and a condition approaching that of 1924, the driest year of record, is indicated. This seasonal forecast for the 1931 water supply, made by the California Division of Water Resources, is based upon the results of the main snow surveys for the season, covering some 160 snow courses throughout the Sierra, and upon all available precipitation data to April 1.

A general summarization of all data shows: The water content of the snow on April 1 of this year in relation to the water content on April 1, 1930, varies from about 30 per cent for certain Owens Valley courses to about 70 per cent at courses in Merced Basin, with a general average throughout the Sierra of about 55 per cent; for those few areas where snow surveys have been made for a sufficient number of years to permit the development of "normals," a water content of the snow in per cent of normal to April 1 is almost as low as 10 per cent for one or two Owens Valley courses, nearly up to 50 per cent for Yuba Basin courses, with a general average of about 40 per cent; the average precipitation to April 1 in per cent of normal to April 1 varies throughout the Sierra from 42 per cent for one station in Owens Valley to about 75 per cent for stations in Stanislaus Basin, with a general average of about 60 per cent, and an average for Los Angeles, San Gabriel, and Santa Ana Basins of 60 to 65 per cent; the estimated 1931 seasonal flow in per cent of the 40-year mean (1889 to 1929) varies from 25 per cent for the Kings Basin to 40 per cent for the Tuolumne Basin, with a combined figure of 33 per cent for the Sacramento and San Joaquin Basins.

In the state of Washington indications are that runoff for the summer and fall of 1931 in the Puget Sound Basin will be below normal, but considerably above the record of the past two or three years, which were the driest in history. The Inland Empire does not fear a water shortage.

In Oregon the situation is not considered serious, although rainfall has been below normal and there is danger of water shortage in the latter part of the summer. There is no snow pack in the Cascades and the loose snow there will melt after a few warm rains. Power companies are not disturbed by these facts, however, because low rainfall during the last two years has given them added impetus to increase their steam generating facilities.

The Intermountain sections will experience during the coming summer one of the most serious water shortages of their history unless a decided increase in precipitation occurs. Up to the middle of March the snowfall was the lowest recorded during the last 29 years, and 25 per cent less than the previous minimum of the year 1919.

Light snowfall in Colorado and precipitation below normal places Colorado in the same position as her sister states, as regards both grain feed for stock and water supply for power generation. A large percentage of load necessarily will be placed upon steam plants.

In Montana the snow in the mountains is light, and there is expected to be a water shortage in the spring and summer. There is a general lack of moisture in Nevada and the western part of the state is anticipating one of the worst water shortages in its history.

Fig. 1. The first all-electric office building. This beautiful edifice is the new headquarters of the Southern California Edison Company Ltd. in Los Angeles. Electricity provides all energy requirements in this modern structure

Tradition Broken With All-Electric Building

New Headquarters of the Southern California Edison Company Ltd. Embody the Practical Application of Electricity for all Requirements of a Modern Office Structure. Complete Building Equipment Designed for 100 Per Cent Utilization of Electric Energy

By H. T. CRANE
Department of Engineering Design, Southern California Edison Company Ltd.

CASTING aside conventional recommendations for office building equipment and courageously pioneering in a new phase of electrification, the Southern California Edison Company Ltd., with its new thirteen-story building in Los Angeles, has given the world the first all-electric office structure years ahead of the time when structural engineers and designers had predicted it would be economically feasible. Not content with specifying that electricity should be the only source of energy used in the operating equipment within the building, this company demanded that its new home be constructed, in so far as the local building code would permit, with electricity. As the result, this company has erected not only a most modern headquarters in which to center its activities, but also a splendid monument symbolizing the implicit confidence accorded the commodity supplied by its organization.

In co-operation with the management and engineering departments of the Edison company, the architects, Allison and Allison, of Los Angeles, have combined the best in architecture, structural design, and electrical equipment into a fitting home for a utility so closely identified with the growth and progress of the West.

Architecturally, the exterior of the building typifies the modern trend toward graceful symmetry of outline and harmonious contrast with surroundings and setting. On the interior, tasteful decorative effects unite with efficient office layout to create ideal surroundings for a maximum co-ordination of effort. No detail to increase the comfort and welfare of the personnel has been overlooked, but the equipment selected for accom-

Fig. 2. Electric arc welding was used extensively in erection operations. This view of the earthquake bracing demonstrates how welding simplifies the fabrication of complicated structural members

Fig. 3. Variable-voltage elevator control equipment operates one freight and six passenger elevators. Control panels are located in the foreground; at the extreme right are three motor generator sets and elevator motors

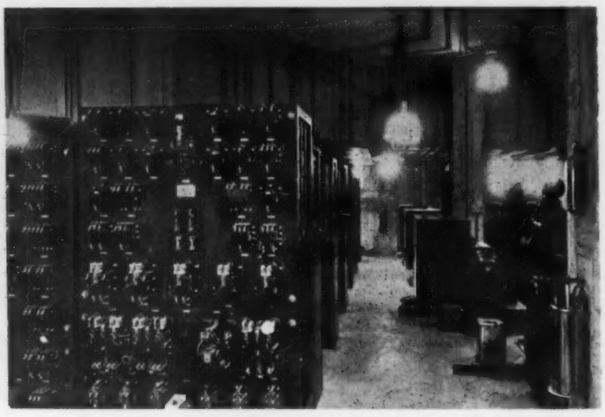
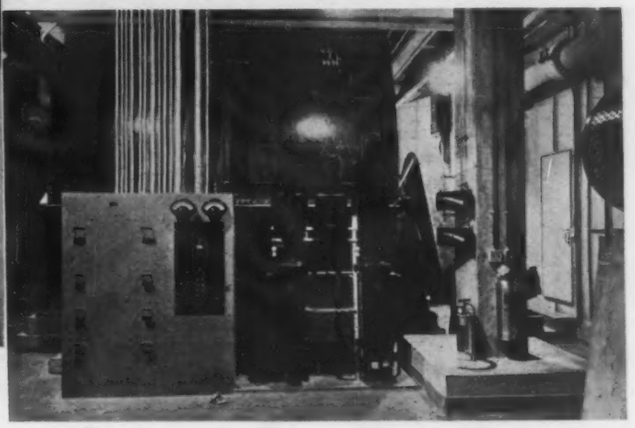


Fig. 4 (above): General view of ventilating and indirect heating system. At left are banks of heating units mounted immediately in front of circulating coils of the refrigerating system. Air is drawn across these two elements by the large fan in the rear and forced into ventilating ducts, being heated or cooled as desired. The room is an expanded portion of the duct system, the grilled opening in the foreground being a damper for regulating air flow

Fig. 5. Control panel for motors driving the ventilating fans. One of the large fans is shown in the immediate background



plishing this is entirely practical and could be used in any similar building to assist in the efficient performance of office duties.

To convey an adequate conception of the thorough manner in which electric energy has been applied to all phases of building requirements, the accompanying pictorial description can be used advantageously. Electricity was first drafted to weld a large portion of the steel framework. Completely welded framework is not permitted by the city building code, but welding was used on the various fabricated portions of the frame and to particularly good advantage in forming and securing the off-standard structural members of the earthquake bracing.

To supply the large power requirements for such an installation, four services are brought in from underground transformer vaults. These services are segregated according to the accompanying table.

Gross volume is 3,778,000 cu.ft., giving 1.6 watts per cu.ft. connected, which is undoubtedly the heaviest electrical load per unit volume installed to date in a structure of this type.

SEGREGATION OF BUILDING SERVICES

Bank No.	Transformers	Voltage	Type of Service	Connected Capacity Kw.
1	Three 200-kva.	120/208	General lighting	750
			Floodlighting	255
2	One 75-kva.	120/208	Emergency lighting	80
3	(A) Three 333-kva.	460	Indirect heating	1,589
	(B) Three 333-kva.	3-phase	Elevators	222
			Refrigerating equipment	855
			Ventilation and miscl.	384
4	From neutral tap of bank No. 3	115/230 3-phase 4-wire	Direct heating	1,329
			Water heating	110
			Convenience outlets	414
			Miscellaneous	93
Total connected load for entire building				6,081

The main switchboard, located in the basement in the southeast corner of the building, is of dead-front construction and includes, in addition to the main and submain air circuit breakers and disconnect switches, the floodlight control panel, a remote group control panel for all direct heaters and penthouse motors, and various re-

Fig. 6 (left): Ozonating equipment which treats ventilating air before it enters ducts for distribution to various portions of the building

Fig. 7 (below): Circulating water coils of refrigerator system, one set carrying chilled water from refrigerating chamber and another set the cooling water from the compressor cylinders containing heat units rejected by refrigerating cycle. Ventilating air may be cooled or warmed by passing it across proper set of coils

Fig. 8 (right): Close-up view of banks of ribbon-type heating units used in the indirect heating system

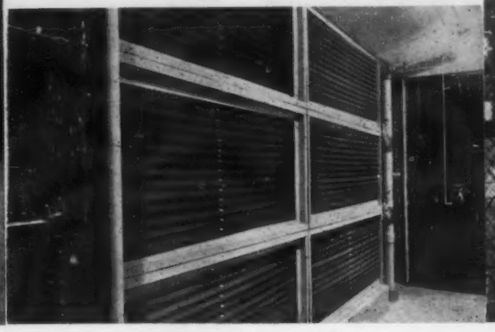


Fig. 9. Arrangement of direct heating system which is accomplished by individual heating units located in each room. The general location of each unit is directly below a window as shown; individual thermostat controls may be seen mounted on the wall above the heater. At left is a close-up of an individual heater

cording instruments in connection with the ventilating system, water supply, and other services supplied.

Distribution from the main board is featured by the use of tubular copper buses for the 230- and 460-volt

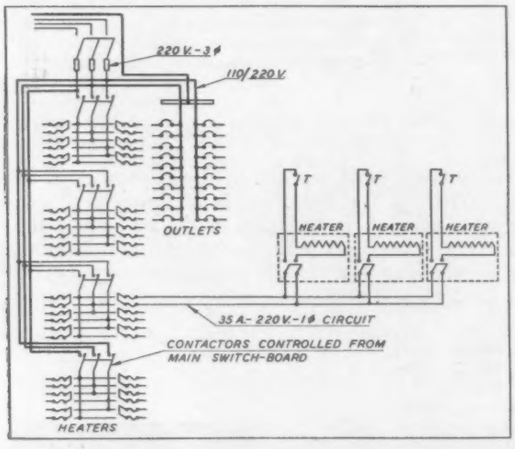


Fig. 10. Typical layout of direct heating circuits showing group control of units on each floor by means of triple-pole-contactor, controlled from main switchboard in basement. Flexibility of heat control is provided through individual switches and thermostats on each heating unit

feeders, detailed description of which appears in another section of this issue.

Because of possible interference arising from the effect of magnetic induction between a 50- and 60-cycle circuit, especially if non-shielded bus systems were placed in close proximity in the same riser shaft, the 60-cycle lighting circuits are run in separate feeder conduits from the main switchboard to the lighting panels on each floor. Diagrams of the various service installations accompany this description and demonstrate the method by which local distribution boards are supplied.

Reference to the above tabulation of power requirements discloses the large amount of energy installed for heating purposes. As noted, the heating capacity is 2,918 kw., which exceeds the calculation of the heat requirement for a building of this type of construction in that locality. However, it was deemed advisable to install the added capacity so that either system might be used during average weather and data obtained as to its relative operating characteristics. Therefore, the heating and ventilating equipment is of particular interest as it is the first large office building to utilize electric heating on the elaborate scale of this installation. Briefly, the system supplements the usual warm air circulating system with direct heaters in every office and every room throughout the building.

The direct heating system consists of 739 direct-heating units varying from 1½- to 5-kw. capacity. Circuit panels for the direct heating units are located on each floor in a central riser shaft. Each panel is bused

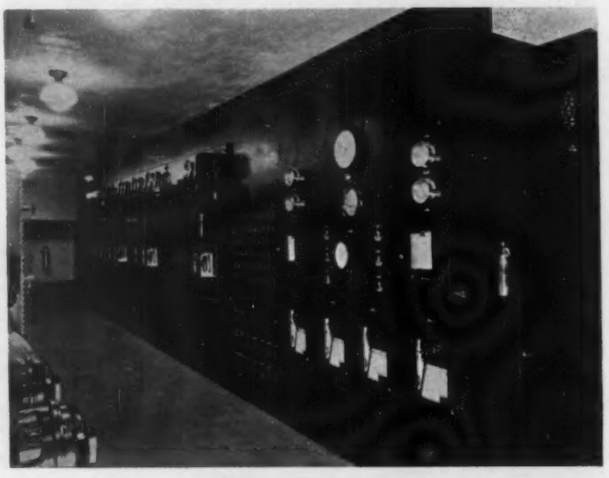
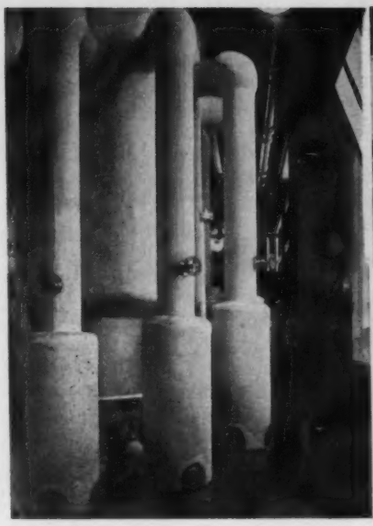
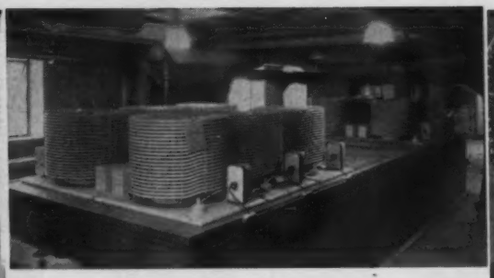


Fig. 11. Main switchboard where indicating, recording, and controlling equipment is concentrated. At extreme left is the Thyratron control for mobile floodlighting effect; next, main air circuit breakers and meters; then, indicating-light control buttons for individual contactors in direct heating circuits and similar remote-control stations for pent-house ventilating, pumping, and water-heating apparatus. At right are the recording instruments for various important services

in four sections to each of which the circuits of one side of the building on that floor are connected. On the line side of each section is installed a latched-in type contactor, which is controlled from the main switchboard in the basement. This puts all direct heaters in the building under centralized control and, if heat is desired





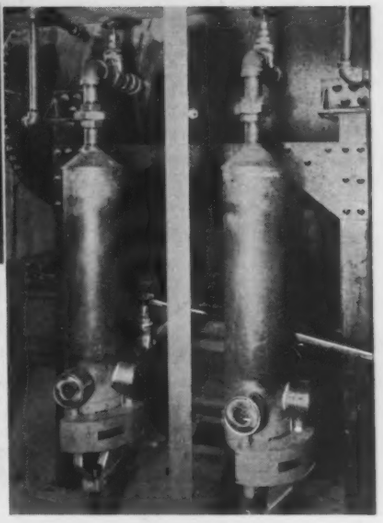


Fig. 12 (left): Water-heating apparatus mounting 90 kw. of immersion heaters which supply the entire building's hot water requirements

Fig. 13 (above): Battery of twelve water-coolers which insure that drinking water for the building will be maintained at proper temperature

Fig. 14 (right): De-aerator which removes air contained in water supplied to building, thereby lessening corrosion in other water conditioning equipment. Two 10-kw. heaters provide heat necessary for this process

in some particular office after working hours, the operator needs only to close the contactor controlling that section of the floor. Each heater has a double-pole tumbler switch and is controlled by an individual, single-coil thermostat. This individual control is used so that alterations or additions of partitions would not separate a heater from its thermostat. Two types of thermostats are used, one of the mercury tube type with gas-filled expansion diaphragm controlling the heater, and the other of the bi-metallic type, operating in connection with a small single-pole contactor.

Because of the close correlation between the direct and indirect heating system, it is necessary to have a general description of the indirect heating installation before the advantages of the combination can be appreciated.

For the indirect heating system, standard 3.8-kw., 110-volt, ribbon-type heating units were selected. Three banks of these units, each incorporating an appropriate heating capacity for the building area served, are mounted in the supply ducts of the ventilating system. One bank of 611-kw. capacity located in the penthouse supplies the top half of the building, another bank of 856-kw. capacity located in the basement supplies the lower half of the building, and a third individual bank of 122-kw. capacity supplies the auditorium ventilating system. Because of the large volume of air passing over these heaters, they can be operated safely at excess capacity, three units being connected in series across 440 volts. Supplementing the electrical units and mounted with them in the ventilating ducts are two sets of tubes. One set circulates the chilled water from the refrigerating system, the other the water used for cooling the compressors, which contains the heat thrown off by the refrigerating cycle. Ventilating ducts, as referred to above, are, in reality, large rooms whose doors form an elaborate damper system for controlling the system's air supply.

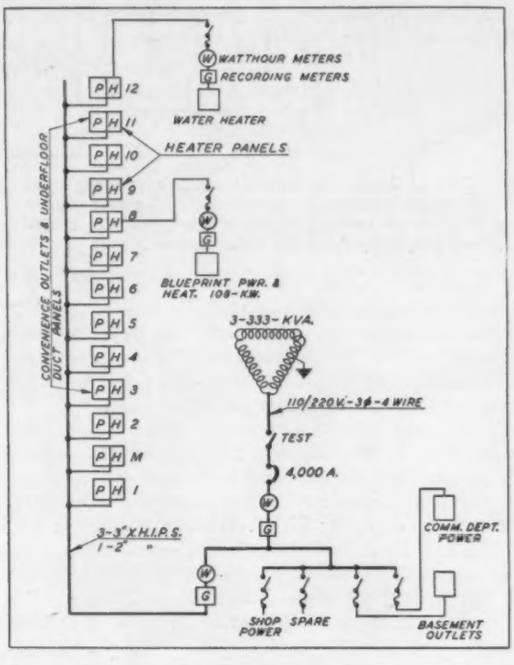
Outside air is drawn in, washed, passed across the tubes and unit heaters, ozonated, and then passed through the ventilating duct system.

According to the dictates of the conditions desired, the air may be cooled by the refrigerating coils or warmed either by the compressor cooling water or by the heating units or both. (See ELECTRICAL WEST, April 1, p. 177, for the theory involved in the refrigerating-heating cycle.)

Single-phase, 440-volt circuits supply the indirect heating units, each circuit being thermostatically controlled with a double-pole latched-in type contactor. The thermostatic control is adjusted so that each heater bank comes out in six steps, a half-degree apart. The main circuit breaker on each heater bank is interlocked with a fan control so that the units cannot be energized unless fans are in operation. A temperature trip is also installed to prevent overheating.

In operation, the direct heaters are turned on some time between 6 and 7 a.m., depending upon the weather conditions. These are all under thermostatic control and bring the temperature up to the required point in all parts of the building. By the use of this direct method, it is not necessary to start the ventilating system until shortly before 8 a.m. and it is not necessary to keep it running to supply heat to a few offices that might be working overtime. As electric heating units in the ventilating system are used to keep the basic temperature of the air above a point at which cold drafts might be

Fig. 15 Single-line diagram of 220/110-volt, 3-phase 4-wire heating and power circuits. The bus riser shown on the left consists of three 3-in. extra-heavy-copper tubes as mains and one 2-in. copper tube as a neutral. From this the heating and underfloor duct panels for each floor are wired



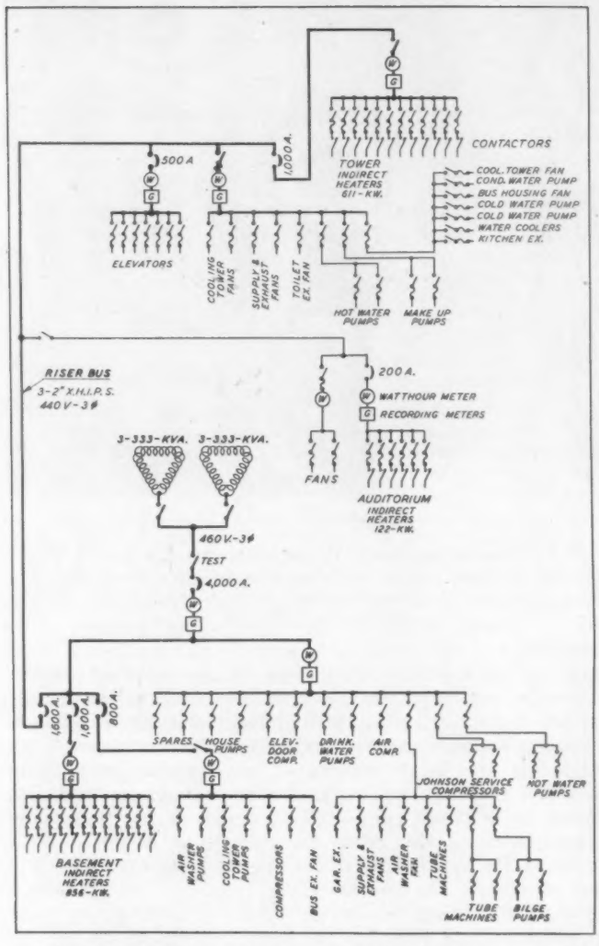


Fig. 16. Single-line diagram of 440-volt power services. Note the three banks of indirect heating units and method of sectionalizing each bank for flexible heat control. Complete and permanent data are provided by the numerous recording meters installed

noticed, or at about 65 deg., every office and section of the building can regulate its own temperature. In this way the natural differences in requirements due to outside exposures can be taken care of. Offices on the north side of the building often require heating at the same time that cooling air is desirable for those on the south exposure.

As weather conditions in southern California make cooling air desirable during certain portions of the year, a complete refrigerating system is installed. To supply sufficient refrigeration for cooling the large amounts of air required, four 200-hp. synchronous motors driving refrigeration compressors are installed. This refrigerating system is unique in that ventilating air may either be cooled or heated, the heating being supplied on the principle of the reversed Carnot cycle mentioned above, making available three to four times the heat equivalent of the mechanical input to the refrigerating system.

Because of the installation of three complete heating systems, namely, the direct, the indirect, and refrigerating systems, this building provides an opportunity for determining their individual merits under identical conditions of operation. To derive the full benefit from this opportunity an elaborate system of meters and recording instruments has been provided so that accurate data may be obtained on the performance of the various units. Watthour meters record power input to the various equipment, and other recording instruments, such as those measuring temperatures of outside air; exhaust for discharge; heater intake; washer intake dry bulb; washer intake wet bulb; supply fan discharge dry bulb; supply fan discharge wet bulb; fourth floor, north and south; tenth floor, north and south, give complete information on the performance of the ventilating system.

Both the hot and cold water supply for the building are provided electrically. Water from the city mains is first treated in a de-aerator upon which are mounted two 10-kw. water heaters. The hot water supply is obtained from a tank mounting six 15-kw. units from which the hot water supply for the entire building is drawn. Drinking water is cooled to the desired temperature in a battery of water-cooling units of standard manufacture.

Other conveniences demonstrate the versatility of electricity in providing a final touch of luxury to the building equipment. A complete radio system is installed with outlets in the executive offices and on several floors. Permanent dynamic loud speakers are installed in the auditorium and club rooms with control so arranged

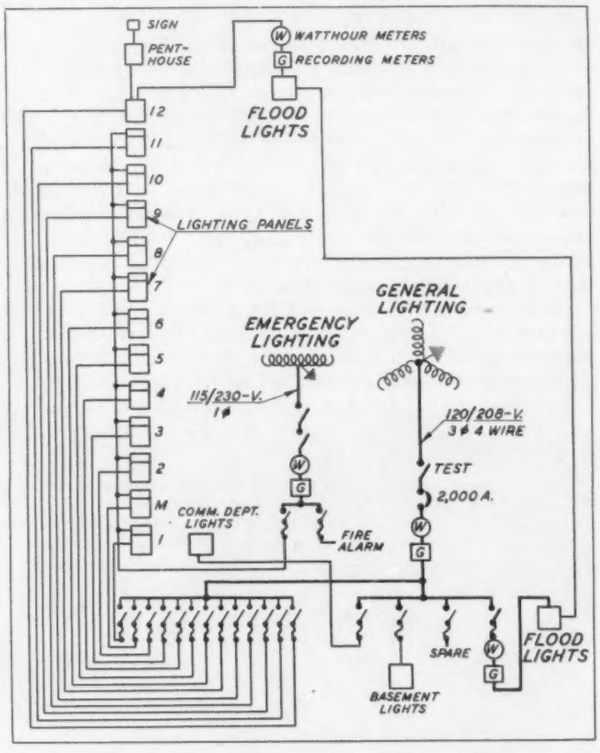


Fig. 17. General layout of lighting circuits showing separate single-phase emergency transformer. Lighting power is supplied from an entirely separate source and at a different frequency from the other power supply

that radio programs or records may be enjoyed. Telechron clocks are installed throughout the building on a special circuit which is automatically connected to a 100-cycle generator of a small motor-generator set when power outages necessitate a correction of time.

In addition to the architects already mentioned, Allison and Allison, other firms shared in working out the infinite details necessary to the completed building. These were: Hunter and Hudson, mechanical and electrical engineers; P. J. Walker, the builder; H. H. Walker, electrical contractor; and the manufacturers, listed elsewhere.

H. L. Doolittle, chief designing engineer of the Edison company, supervised all work, with the assistance of C. B. Carlson, in structural design, and the author, in electrical design.

Reactive Kva. Metering---VIII

Part 1. Three-Element Meters Give Accurate Registration of Reactive Kva. on Four-Wire Circuits If Voltages Are Balanced

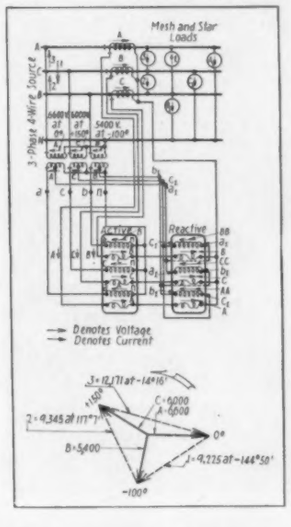
By E. C. GOODALE
Tacoma, Washington

IN METERING three-phase, four-wire circuits, the correct rule to follow, of course, is Blondel's Theorem, which states that, to meter any circuit correctly, one less wattmeter or watthour meter element is required than there are conductors.

A current coil is used in a series connection (directly or via current transformer) in each conductor but one, which latter we will call the "common," the voltage coil in each case being energized (directly or via voltage transformer) from the corresponding conductor to the common. In metering a three-phase, four-wire circuit the correct and best way is to choose the neutral wire as "common." This allows all the voltage coils of the meter to operate at approximately the same rating. Of course any of the conductors could be chosen as "common" and correct metering still would result provided the voltage elements were especially designed to operate at the voltages resulting from such a condition. It is doubtful, however, if such a connection ever would be necessary.

Meter connections and circuit conditions for a badly unbalanced circuit are shown in Fig. 25. The connection, as such, will give absolute accuracy for power measurement regardless of this unbalance in either source voltages or load currents. The reactive meter shown will give correct measurement, however, only as long as the source (line) voltages are balanced. If they are balanced the reactive meter will register correctly regardless of the unbalance of the line currents, load currents, or power factor. With the unbalanced conditions of Fig. 25 incorrect registration will result on the reactive meter.

Fig. 25. Three-phase, four-wire, three-element meters on a badly unbalanced four-wire circuit. Assumed relations of the line-to-neutral voltages are shown in the vector diagram. Details of other assumptions follow:



ASSUMPTIONS PERTAINING TO FIG. 25

Line-to-neutral voltage A = 6,600 at 0° to right horizontal.
Line-to-neutral voltage B = 5,400 at −100° from right horizontal.
Line-to-neutral voltage C = 6,000 at + 150° from right horizontal.

Line-to-neutral current A_1 = 300 amp. in phase with voltage A.
Line-to-neutral current B_1 = 180 amp. 60° lagging voltage B.
Line-to-neutral current C_1 = 240 amp. 30° lagging voltage C.

Line-to-line current 1 = 150 amp. 30° lagging voltage 1.
Line-to-line current 2 = 210 amp. 40° lagging voltage 2.
Line-to-line current 3 = 130 amp. 20° lagging voltage 3.

Potential transformer taps a_1, b_1, and c_1 are at 57.7 per cent of full secondary winding, measured from common side in each case.

The active or power meter, however, will register correctly under all conditions, and therefore will function properly as a meter for billing purposes. Reactive meters usually are not used for direct billing purposes and hence the relatively small errors which they suffer under conditions of unbalanced voltage will, except in special cases, not be objectionable. The usual case of unbalanced voltage on a power line is from 1 to 3 per cent unbalance and from 1 to 3 deg. out from the ideal 120-deg. relation. Hence the assumed example of about 18 per cent undervoltage on one leg, and 9 per cent under on the other, together with a phase distortion of + 30 deg. in one case and −20 deg. in the other represents a particularly bad case of unbalance. (The unbalance in loads is immaterial when the voltages are balanced.)

Assumed vector relations of the line-to-neutral voltages are as shown in the vector diagram of Fig. 25. The dotted lines, then, must represent the line-to-line voltages, being made up of the vector difference between the line-to-neutral voltages of the two lines considered, in each case. Assumed vector relations of the line-to-neutral load currents with respect to the line-to-neutral voltages forcing these currents through the load are as shown in Fig. 26. The power expended, of course, is equal to the product of the voltage multiplied by the power component of the current with respect to this voltage, in each case.

Since current A_1 is in phase with voltage A its power component with respect to voltage A is equal to itself or 300 amp. The power supplied to the line-to-neutral load A_1, therefore, is $6.6 \times 300 = 1{,}980$ kw.

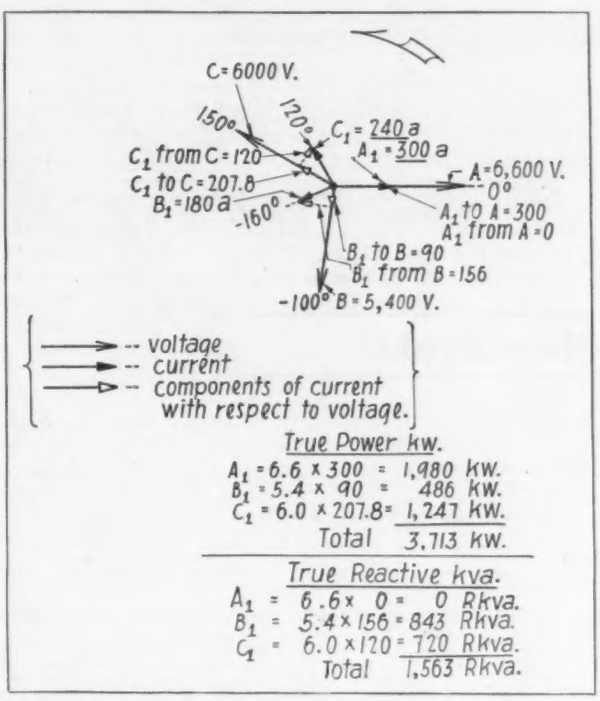


Fig. 26. Determination of true power and true reactive kva. to the star loads A_1, B_1, and C_1 of Fig. 25

Similarly, the power component of the current B_1 multiplied by voltage B is the power taken by load B_1. The power component of current B_1 with respect to voltage B is found graphically (and checked by trigonometry) to be equal to 90 amp. Power to B_1, therefore, is $5.4 \times 90 = 486$ kw. In like manner the power component of current C_1 with respect to voltage C is found to be 207.8 amp., and hence the power to C_1 is $6 \times 207.8 = 1{,}247$ kw.

The total power to the line-to-neutral loads, therefore, is the sum of these three parts, or 3,713 kw.

Phase relations between the mesh or line-to-line load currents, assumed for this example, are shown in Fig. 27, together with their corresponding line-to-line voltages. These latter were determined in the vector diagram of Fig. 25 from the known line-to-neutral voltages. Current 1 power component with respect to voltage 1 is found to be 129.9 amp., thus drawing $9.225 \times 129.9 = 1{,}190$ kw. Similarly, the power component of current 2 with respect to voltage 2 is 160.9 amp. and the power it draws is $9.345 \times 160.9 = 1{,}500$ kw. In like manner current 3 power component is 112.8 and its power is $12.171 \times 112.8 = 1{,}370$ kw. The total power to the mesh loads is the sum, or 4,060 kw.

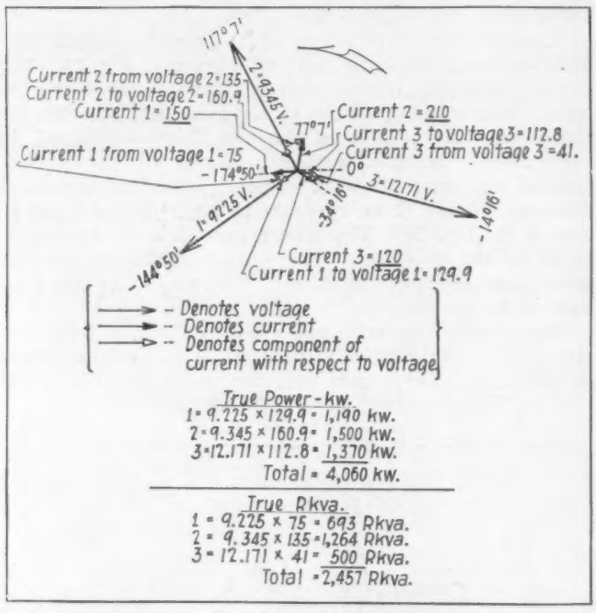

117°7'
2 = 9.345 V.
Current 2 from voltage 2 = 135
Current 2 to voltage 2 = 160.9
Current 1 = 150
Current 2 = 210
77°7'
Current 3 to voltage 3 = 112.8
Current 3 from voltage 3 = 41.
Current 1 from voltage 1 = 75
-174°50'
-0°
3 = 12.171 V.
-149°16'
34°16'
1 = 9.225 V.
-144°50'
Current 3 = 120
Current 1 to voltage 1 = 129.9
-- Denotes voltage
-- Denotes current
-- Denotes component of current with respect to voltage
True Power - kw.
1 = 9.225 x 129.9 = 1,190 kw.
2 = 9.345 x 160.9 = 1,500 kw.
3 = 12.171 x 112.8 = 1,370 kw.
Total = 4,060 kw.
True Rkva.
1 = 9.225 x 75 = 693 Rkva.
2 = 9.345 x 135 = 1,264 Rkva.
3 = 12.171 x 41 = 500 Rkva.
Total = 2,457 Rkva.

Fig. 27. Determination of true power and true reactive kva. to the mesh loads 1, 2, and 3, of Fig. 25

Total power taken by both star and mesh loads, therefore, is $3{,}713 + 4{,}060$ or 7,773 kw. It is this amount, then, which the active or power meter must register for correct metering to be in force. In the accompanying vector diagrams the power component of a current with respect to a voltage is noted simply as "A_1 to A," "B_1 to B," etc. On these same diagrams the reactive component of a current with respect to its voltage is noted as "A_1 from A," "B_1 from B," etc. This, of course, is to do away with too much writing on the diagrams. The total reactive component of the load may be taken as the sum of that supplied to the star or line-to-neutral loads plus that taken by the mesh loads.

The reactive component of current A_1 with respect to voltage A is found to be zero. Hence there are no reactive kva. to load A_1. B_1 reactive component with respect to B is 156 amp. Hence the Rkva. to load B_1 is equal to the product of this multiplied by the kilovolts of B, or $5.4 \times 156 = 843$ Rkva. to load B_1. In the same way the reactive component of C_1 with respect to voltage C is 120 amp. and the Rkva. to load C_1, therefore, is $6 \times 120 = 720$ Rkva. This gives a total of 1,563 Rkva. to the star loads.

In the first mesh load, current 1 has a reactive component with respect to its voltage, 1, of 75 amp., hence drawing $9.225 \times 75 = 693$ Rkva. (See Fig. 27.) In a similar manner current 2 has a reactive component of 135 amp. and takes $9.345 \times 135 = 1{,}264$ Rkva., while current 3 has a reactive part of 41 amp., drawing $12.171 \times 41 = 500$ Rkva. The total Rkva. to the mesh loads, therefore, is 2,457 Rkva., and the total to both kinds of load is $1{,}563 + 2{,}457 = 4{,}020$.

A correct reactive meter should register this amount. However, because of the dependence of this connection upon balanced conditions in the line-to-neutral voltages it will be found that for the badly unbalanced example assumed there will be an appreciable error. Power, on the other hand, will be found to be correctly metered on the active meter regardless of this unbalance.

▼ ▼ ▼

New Books

SHORT WAVES, by Charles R. Leutz and Robert B. Gable. Cloth-bound; 6 x 9 in.; 369 pages; 185 illustrations. First edition. Published 1930 by C. R. Leutz, Inc., Altoona, Pa. Price $3.—Contains data on theory, progress, and manufacture in the short-wave field, collected and compiled by the authors, well-known radio engineers. Easily read and non-mathematical, the book is for all classes of short-wave enthusiasts. It comprises an historical review and sections on short-wave propagation, radio telephony and telegraphy, directional antenna, television, aircraft radio equipment, short-wave receivers, ultra-short waves (medical), and amateur short-wave equipment. Conclusive and full, this book presents a good vision of the field.

ELECTRICITY, by E. E. Burns, physics instructor, Austin High School, Chicago. Cloth bound; 8 x 5 in.; 231 pages; 207 illustrations. Published 1930 by D. Van Nostrand Company, New York. Price $1.75.—Designed as a text-book for beginning pupils in electricity, the volume starts from simplest principles and covers both d.c. and a.c. currents, including applications, intruments, and machinery. Non-technical in examples, the book is meant to be lucid without being childish.

HOUSE WIRING, by Thomas W. Poppe and Harold P. Strand, respectively electrical engineer and master electrician. Cloth bound; 6½ x 4 in.; 215 pages; 176 illustrations. Seventh edition, revised in 1930 and published by The Norman W. Henley Publishing Company, New York. Price $1.—Intended for the electrician, helper and apprentice, this handy guide describes and illustrates up-to-date methods of installing electric light wiring, bell and telephone wiring, and burglar alarms. Many labor and time saving operations are included, all of which conform to the 1930 Underwriters' code.

COMMERCIAL A.C. MEASUREMENTS, by G. W. Stubbings. Cloth bound; 6 x 8 in.; 320 pages; 169 illustrations. Published 1930 by D. Van Nostrand Company, New York. Price $6.—The author, an Englishman, has written fairly exhaustively on the theory and practice of the measurement of current, voltage, power, energy, and power factor in a.c. circuits. Power factor and volt-amperes in an unbalanced three-phase circuit have been illustrated by resolution into symmetrical components. The book is primarily for testing engineers and college students interested in electrical measurements. Thus, it starts with a short synopsis on the a.c. theory as a review of the fundamentals. Successive chapters treat of the measurement of separate quantities such as reactive power and kilovolt-amperes. Trigonometry of the a.c. theory is covered in the final chapter.

TELEPHONE THEORY AND PRACTICE, Theory and Elements, by Kempster B. Miller, consulting engineer. Cloth bound; 9½ x 6 in.; 471 pages; 272 illustrations. Published 1930 by McGraw-Hill Book Company, Inc., New York. Price $5. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco.—This book, by the same author as *American Telephone Practice*, is really an elaboration of that standard work. The first of a three-volume series designed as a comprehensive manual for the student and as a reference for the advanced telephone worker, this volume covers the history and elements of telephony, elementary theory, and apparatus in thorough and understandable detail. Acoustics has been treated more liberally here than before.

POCKET-BOOK OF ELECTRICAL RULES AND TABLES, by Munro and Jamieson, revised by W. R. Cooper and Rollo Appleyard. Cloth bound; 4 x 6 in.; 750 pages; 311 illustrations. Twenty-third edition, published 1931, by J. B. Lippincott Company, Philadelphia. Price $4. This is a cheaper, revised edition of previous Munro and Jamieson handbooks. It combines the good features of a text-book with those of a reference table, making the contents understandable to any engineer or electrician with fundamental grounding. The 40 chapters include considerable data on submarine cables, standard charts and formulas, tables, and testing information on all sorts of electrical apparatus.

EXPERIMENTAL ELECTRICITY, by Ralph H. Walters, instructor in electrical engineering, Los Angeles Junior College. Cloth bound; 8½ x 6 in.; 141 pages, illustrated. Published 1930 by McGraw-Hill Book Company, Inc., New York. Price $1.50. For sale by McGraw-Hill Retail Room, 883 Mission St., San Francisco. —This manual of experiments in a.c. and d.c. electricity is for the student who wishes to enter the field on a semi-professional level. Men who do not intend to study engineering as a profession, or who have limited time, means, or analytical interest, may find this book valuable.

Fault Currents on 110-kv. Line Checked by Service Tests

By L. M. ROBERTSON
Transmission Engineer, Public Service Company of Colorado

SEVERAL interesting tests measuring false currents, potential gradients, and telephone interference on its new 110-kv. wood-pole, H-frame transmission line, were conducted recently by the Public Service Company of Colorado. Two types of structures were tested,—one, with all insulator and crossarm hardware bonded and grounded and connected to an overhead wire, was practically the equivalent of a steel tower with overhead ground wire, and the other was of the type which made full use of wood for insulation and had only a double gap on the poles for lightning protection. Each gap on the latter structure was spaced 34 in. between points, the bottom gap being grounded by a wire running to the base of the pole, while the top gap was connected to the top of the pole. There was no bond from the point of insulator connection on the crossarm to the wire on the pole. This form of construction is illustrated in Fig. 1.

Tests were made with the line energized from a 25,000-kw. turbo-generator through a 22,500-kva. transformer bank, all of this equipment being isolated from the system. Using the structure shown in Fig. 1, a fault current was started by connecting a 5-amp. fuse wire from the suspension clamp to the top horn of the pole gap and also by connecting fuse wire across gaps CD and EF. The station circuit breaker was then closed and three arcs were formed across the points AB, CD, and EF, as shown in Fig. 2. The length of arc in this instance was 11 ft.

Fig. 1. Typical unguyed H-structure for 110-kv. transmission line showing pole protection

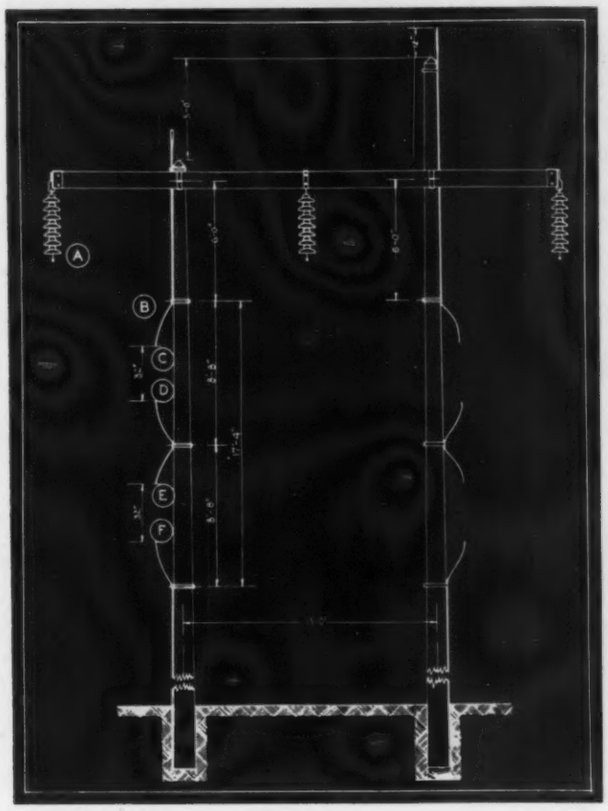


Fig. 2. Three arcs produced on the structure illustrated in Fig. 1, to check fault current calculations and relay operation

Unsatisfactory relay operation had been anticipated on account of the long gap and arc length, and the rather high ground resistance which probably would have been encountered. However, the actual fault current was 491 amp. through a ground resistance which measured 12 ohms at the butt of the pole. As the calculated current was 574 amp. some reduction in fault current could be attributed to the above factors. Ground rods were driven near the pole and connected to the pole ground, this condition causing the ground resistance to drop to 9 ohms and the fault current increased to 518 amp. During these tests, no ground potential could be measured at a distance of 10 ft. from the pole.

Using the structure which had all insulator and crossarm hardware bonded and connected to the overhead ground wire, a similar fault current was produced by connecting a 5-amp. fuse wire across the insulator string between arc horns. The resistance at this structure measured 2.5 ohms with a Megger, the calculated resistance being 0.8 ohms. With an arc length which, in this case, measured only 36 in., the distance across the insulator string, the fault current developed was 520 amp. The potential of the ground wire was measured on a structure one span away and found to be 200 volts to ground.

It is interesting to note that a slight breeze parallel to the line caused the arcs to bow out considerably, and that the arc from the conductor to the pole did not travel along the conductor, but remained at the clamp.

Fault currents obtained from these tests indicated that satisfactory relay operation could be expected within the calculated time limit. Apparently there is a reduction in the fault current on the ungrounded structure as compared with the grounded structure, but there is sufficient fault current developed on the ungrounded structure to make relay operation satisfactory without the use of auxiliary grounds at the butt of the pole.

A Country Shop Meets City Competition

Because He Inherently Knows Local Conditions and Problems to Be Met Better Than His City Competitor, a Small Town Dealer is a Step Ahead on Local Bids; but He Has to Read and Study Latest Practices to Get the Work

MOTOR dealers in small communities may be inclined to feel that their opportunities are limited and their problems mostly those of many small details too trivial for the larger shops in the big cities to handle. Not so J. L. Mitchell, of Oxnard, Calif., who, although located in a small city of approximately 7,000 population, has so organized his company and shop that, not only are the small jobs well cared for, but the large ones are handled and sold successfully.

For Mr. Mitchell is a reader and a student. Although located in the country, he makes use of current publications to keep him acquainted with the latest developments in the art of electric distribution and application. He studies new books and watches the trends which affect his business. Long a member of the Electragists, he has always been an active participant in its Motor Section. He is an associate member of the International Association of Electrical Inspectors and the American Society for Steel Treating. Through these means and by the generous and well calculated use of the special training and facilities of the larger manufacturers and the power company sales engineers, he has been able to cope with large-city contractors in the special engineering and design of the larger projects within his territory and so sell them to those who are undertaking the projects.

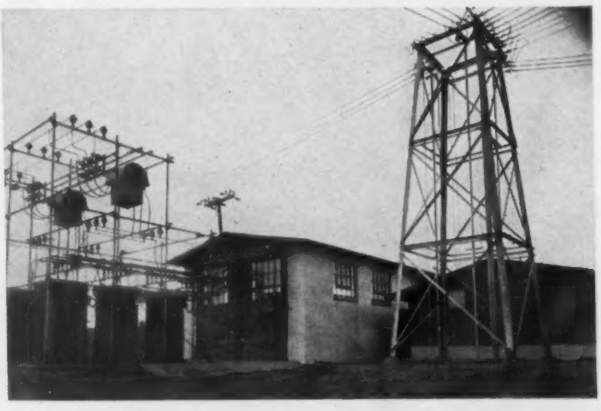
One example of this alertness to new conditions was recounted in ELECTRICAL WEST of March 1, 1929, p. 163. In that article Mr. Mitchell's manufacture and sale of complete housed-in metal switch and control cabinets for outdoor pumping plant installations was described.

A particular example of a piece of special engineering and construction work that called into play the qualities just mentioned was the layout and installation of the pumping system for the Las Posas Valley Mutual Water Company, zone 1 and 2 systems. This is in the vicinity of Oxnard, Calif., near the small town of Somis. The water system serves 4,500 acres and has a capacity of 1,200 miner's inches of water, or 108,000 g.p.m.

The water is pumped from eight wells, dumped into a large sump and there picked up by four booster pumps in the main plant and distributed over the system. The problem involved was one of selection and installation of the proper size pumps, the necessary control for automatic operation of these pumps, the installation of a distributing system to the booster stations served by eight wells, and provision for automatic warning of trouble to the superintendent of the district.

For this purpose, in the main pumping plant there were installed four squirrel cage motors of different capacities, each to supplement the other in rotation as the water level is reduced in the sump. These consisted of one 100-hp. motor, two 125-hp. motors, and one 200-hp. motor. Float valves in the sump operate these booster pumps. They are set at various levels so that as the water levels drop additional capacity is turned on. From these pumps a 26-in. steel pipe line feeds the zone 1 district and carries the water to zone 2 where it is again raised by the other two booster plants. At the second plant there are installed two 40-hp. motors and one 30-hp. motor. At the third are installed two 40-hp. motors and one 25-hp. motor direct connected to pumps which feed the laterals of the farther regions of the system.

The main switchboard is one constructed by Mr. Mitchell in his own shop. Built in the shape of a U, it is served by means of open buses from a substation located outside the building. The distribution circuits from the switches feed into a gutter in the floor below the switchboard in separate conduits which run to the other plants from a central steel distribution tower outside the main plant building. The switchboard contains



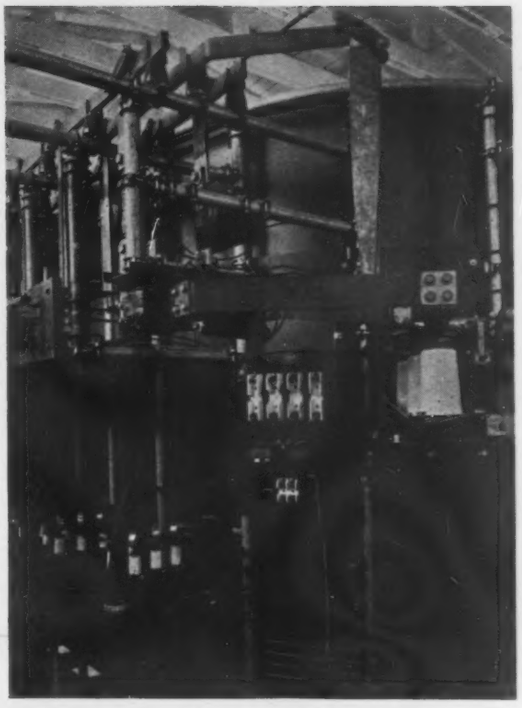
Above: Distribution center for the system. Note the buses from the transformer bank into the swichboard room, and the steel tower from which feeders to the other plants take off. Left: The interior of the pump room at the main plant. The switchboard is in the room opening at the end

eleven panels of formed metal or slate on each side. Of the 22 panels, fourteen are now in use, leaving space for eight future panels if extensions are to be made in the future.

Each motor circuit is protected by a Westinghouse F22 oil circuit breaker with a knife blade disconnect ahead of it. Each circuit has an individual ammeter on the panel to act as a telltale indicator of any abnormal condition on the circuit. Provisions are also made for making polyphase watt-meter and power factor check on each motor through a secondary bus system run along the bottom of the switchboard and carried to a common plug outlet on the face of the board for plugging in the watt-meters. Individual watt-meter switches are provided for this purpose also.

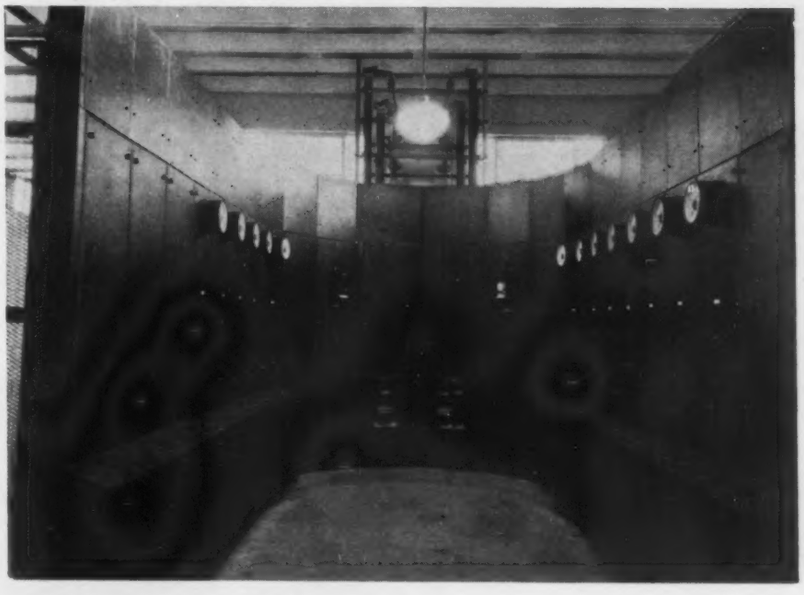
The alarm system is so arranged that the individual motors in operation can be thrown on the alarm system; thereafter should there be interruption of power on a line feeding an individual motor or a surge due to an overload in the pump or an external line surge kicking the motor off, thereby taking the load off the line, the alarm shows an indicating light on the main board, blows a horn at the station, and rings a bell in the operator's residence.

The two central panels of the board contain 1,200-amp. test switches for the power company so that tests can be hooked up cold in safety. The entire irrigation system is served by the Southern California Edison Company Ltd., which meters through two demand meters. On the board, therefore, on each side of the U shaped panel are mounted Westinghouse type U graphic recording volt-meters.



Above: Back of a section of the board, showing main oil switch at right and individual oil switches at lower left. The secondary test buses are faintly seen at the lower center portion of the picture

Right: The U-shaped main switchboard for the system, showing individual panels, meters, opertating handles, and the bench along which are located the plug outlets for making tests



Below: Close-up of bench on which are mounted plug outlets for attaching testing equipment. Snap switch and pilot lamp give control of the watt-meter circuit

The main circuit breakers are made to interrupt 27,000 amp. on one side and 13,500 amp. on the other side for short-circuit interruption. The main panels in which the circuit breakers are mounted are in slate. The filled-in panels are made up of form metal both top and bottom. By taking off the metal panel front, access is given to the secondary or testing bus system at the lower portion of the board. Each unit is bused for 1,500 amp. with future provisions allowed.

Distribution outside the main switch room is brought in through the bottom of a steel tower, 30 ft. high, by

means of conduit. From the top of this tower seven feeders go out on individual pole lines to supply the pumping station of the system.

The main power supply is received at 15,000 volts and stepped down to 440 by means of six 200-kva. transformers, arranged in two banks.

In selling this installation in competition with large-city motor shops, Mr. Mitchell worked out much of the design employed and sold it on the strength of the particular reasons for its fitness to the needs of the district. In the working out of such designs, Mr. Mitchell makes a practice of frequent consultation with the manufacturers' specialist engineers and power company specialists in order to provide his client with the best possible apparatus and the latest methods of operation. By doing this, he has to offer from his little shop in a small town all of the brains and engineering facilities of the larger organization in the big city.

Because his jobs are sold on their engineering, they are always sold at a reasonable and sound profit. It takes diligence and study to keep up with the rapidly moving times, but Mr. Mitchell finds that it pays to do so.

▼ ▼ ▼

Geared Up To Present Day Conditions

The Economic Status Has Made the Motor-Dealer's Existence a Marginal Speculation, but Enterprise Electric Works Purchased Safety Through Modernization

WHEN a progressive, alert motor dealer, the needle in a haystack of passive, conservative shops, is found, a serious moment of congratulatory rejoicing may be held. San Francisco boasts of several such needles, not the least of which is the Enterprise Electric Works, of which G. E. Roe is the manager.

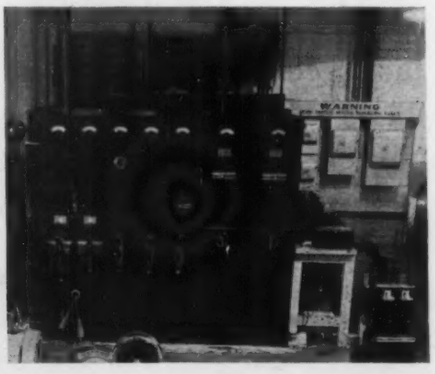
Motor specialists find that the most serious economic situation that they face is caused by the constantly lowering prices of new equipment and the sale, direct to manufacturers of motor-driven equipment, of the motors used in their products. It is difficult for the repair shops to re-habilitate old equipment at a cost less than that of a new replacement. Thus is presented a marginal obstacle which none but the most economical and efficient shops can surmount.

To meet this situation, this concern determined to equip itself with the best devices, chop off all unnecessary overhead, and so systematize the shop that the cost of repair business would be in line with the present low prices of motors. Margins on the sale of new motors being so small, and on a true cost basis, the sale of a new motor representing a loss to the firm rather than a profit, it became more important to gear the repair business to a profitable ratio.

First in this series of modernization moves was the consolidation of the shop and warehouse, formerly in separate buildings, under one roof. Not only did this effect a tremendous saving in rent, but it saved almost as much in employees' time. The efficient arrangement planned and supervised by A. J. vonAhn, repair superintendent, provides for little wasted motion. Under the new arrangement, the repair shop is on the lower floor and a balcony is used for storage. Heavier equipment, such as hoists and very large generators, is kept for the time being in a building next door.

Two large traveling cranes, of 2- and 5-ton capacity, are mounted above each other and control the entire floor. Two smaller 1-ton cranes are used on the balcony along the aisles. Thus nowhere in the shop is it necessary to lift equipment or stock manually.

The center of the floor is used for the testing and disassembling of larger machines. At one side is a large Young Brothers bake oven with 12 kw. in vertical General Electric heating units controlled by a time switch and thermostat. Coil winding machines and benches for coil and armature work are here also, flanked by an Enterprise-designed, Diamond-made test board. Though simple, the board supplies two- or three-phase, 220/440/2,300-volt power; single phase, 110/220-volt power; and 110/220-volt d.c., intercontrollable and available from



Above: Test board from which 110/220 volts d.c., and as high as 2,300 volts, 3-phase, a.c., are taken from the same leads, shown at lower left of board. Switches above leads control voltages

Left: General view of shop looking towards the rear. The two cranes, with the help of auxiliary cranes, control all parts of the floor and balcony. Machine shop may be seen at the left underneath the balcony

Right: Section of balcony showing pulley shelves. Note small crane and sliding ladder which make it unnecessary for an employee to lift heavy apparatus manually. Salvaged and re-conditioned motors are kept in the center of the balcony at the left in the picture

Left: All sorts of winding may be done with machinery in the coil department. In the foreground are double coil-winding machines which wind from one to six coils at a time. The lighting throughout is sufficient for work at all times

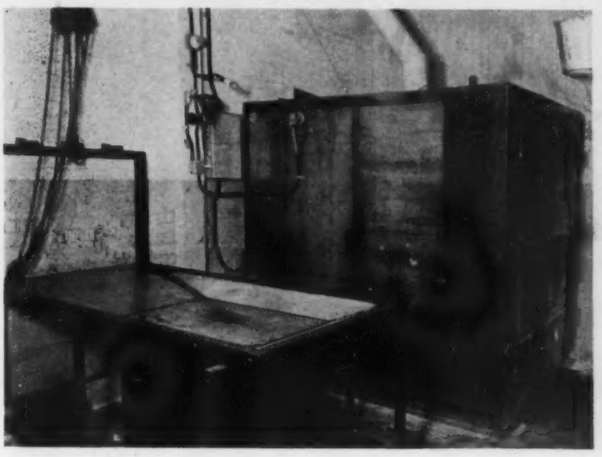
the same leads, which wind automatically on a spool behind the board.

A special cleaning room for equipment contains a distillate bath and an electrically heated, theormostatically controlled Oakite tank. When the 7½-kw. G. E. heaters are on, the cleaner is circulated by convection, but when these are off a motor-driven circulating pump performs the task.

On the other side of the building is the complete machine shop and stock room, in which material is expertly pigeonholded and cataloged.

Pulleys, wire and salvaged and re-conditioned equipment are set on sections of the well lighted balcony. Other sections of the balcony are given over to the storage of future repair work and to the employees' locker room.

By means of the expert consolidation and expense trimming, Enterprise officials were able to strengthen their repair margin and to keep busy practically the normal shop force, 22 men, during slackened business times.



Above: Cleaning department, with distillate bath in the foreground and Oakite tank at the left. A monorail crane handles all equipment in this room. The electrically heated tank is thermostatically controlled and circulation of the cleaner is enhanced by a motor-driven pump. A paint gun is also part of the room's equipment

Left: Bake oven and varnish tank. Time switches and thermostat which control the oven are mounted on the wall to the left center. A special tree can be inserted over the tank for draining coils and similar equipment

Edison Building Features New Construction Methods

Articles prepared in collaboration with H. T. Crane, Department of Engineering Design, Southern California Edison Company Ltd., and H. H. Walker, Electragist, Los Angeles

Tubular Bus Riser System

BECAUSE power is obtained from one source and lighting from another, the requirements for the various types of service within the building necessitated the use of a triple bus installation. Extending across the basement ceiling to a riser shaft, two of these buses extend to the top of the building, taps being taken off each bus to supply the associated panel distribution board on each floor. The third, or lighting bus system, takes off entirely separately, directly from the basement switchboard to the main ventilating duct riser shaft. This combination, which has the advantages of high capacity for the space occupied and ease of making taps, is in accord with modern construction practice pioneered by Hunter & Hudson, consulting engineers of San Francisco. (For general details of this type of construction see ELECTRICAL WEST, Aug. 1, 1930, p. 82, describing a similar installation in the Shell Building, San Francisco.)

Contractors—

and engineers, although the building described is one of a utility company, may derive many new ideas from the features of the Edison Building. This structure embodies the latest design features in

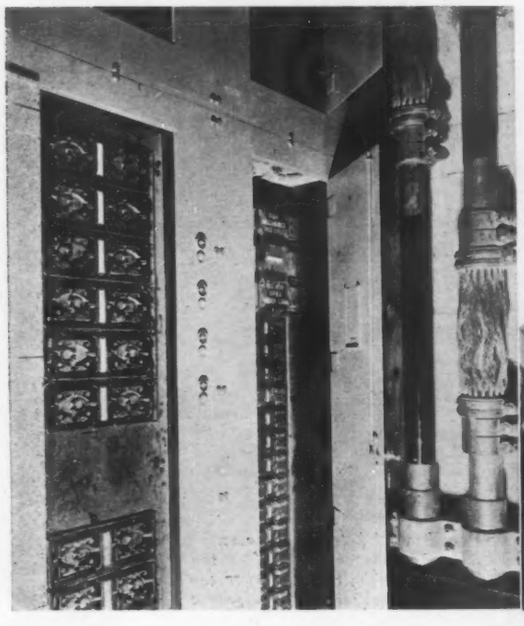
Bare bus distribution
Underfloor duct
Lighting
Floodlighting
Heating and air conditioning

It is a demonstration of best practice to which other jobs may be compared.

Power requirements in this all-electric building were sufficiently large to warrant the use of tubular copper bus. The 115/230-volt bus consists of three 3-in. extra heavy I.P.S. copper tubes with one 2-in. tube for a neutral. Similarly, three 2-in. extra heavy I.P.S. copper tubes are used for the 460-volt three-phase power bus. Each of these two sets of buses is carried in an individual ¼-in. ebony asbestos housing.

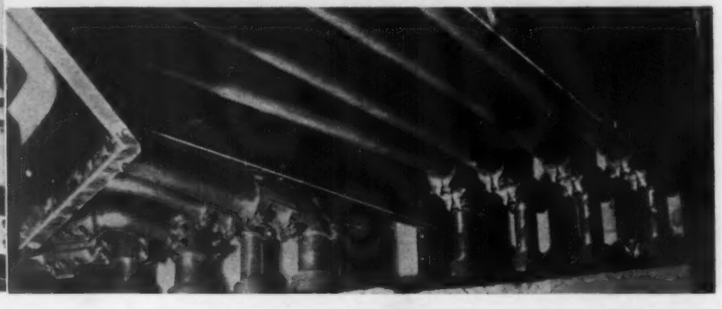
Construction features of the tubular bus were engineered to insure a permanent trouble-free installation. The upper half of each bus is suspended as shown in Fig. 4, while the lower half rests on a solid base fitting. At the sixth floor a standard expansion fitting connects the two halves of the bus. Details of this connection are shown in Fig. 5 which also depicts the variation from the Shell installation in the manner in which the buses are rigidly separated by a special brass fitting, insulated from the bus with a fiber sleeve instead of being separated by means of a cut-out split sheet of ebony asbestos.

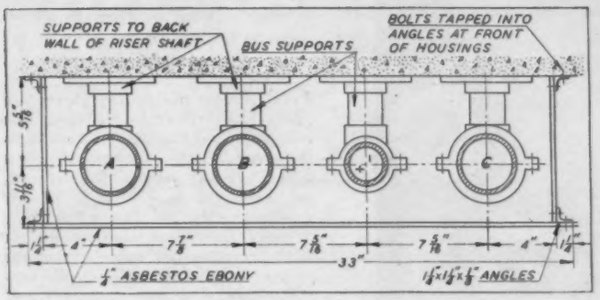
Two such cast brass spacers with insulating sleeves are placed between floors to take possible short-circuit stresses, this construction being carried out not only in the riser shaft but also in the horizontal run across the basement ceiling to the main switchboard.



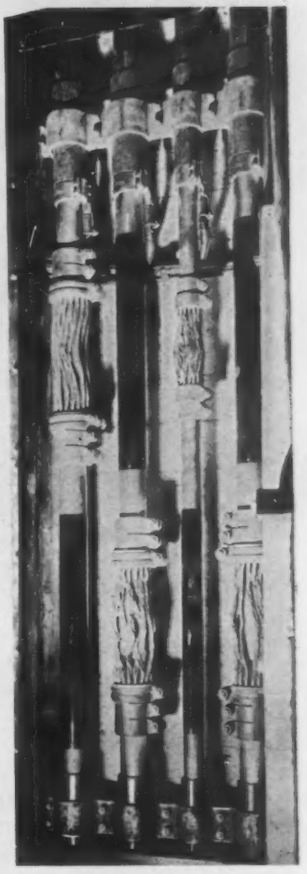
Left: Fig. 1. Heating and convenience outlet panel at the sixth floor showing Saf-T-Fuz equipment. In the compartment above are four direct-heating contactors controlling sections of direct heaters on this floor. At the right, two expansion joints with spacers and protecting insulator sleeves for the heating and power bus are shown

Below: Fig. 2. Lower support for bottom half of main vertical buses showing method and fittings developed for tapping off horizontal runs across basement ceiling to main switchboard. Each set of buses is shielded in an ebony-asbestos housing





Left: Fig. 3. Cross-sectional drawing of heating and power bus supports at each floor level showing the neutral bus between B and C. Note that insulation is not provided along the back of bus housing

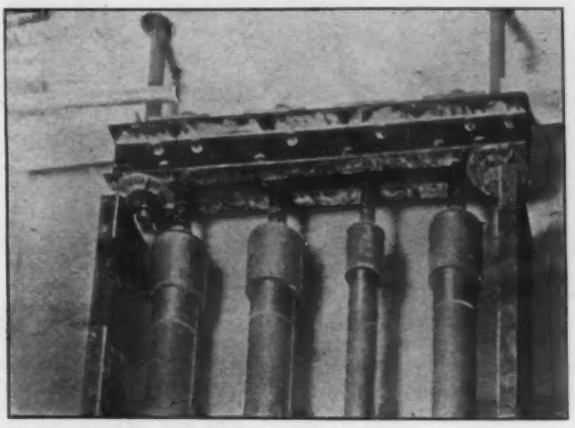


Right: Fig. 6. Expansion joints in heat and power bus at sixth floor. Here the upper half of the bus, suspended as shown in Fig. 4, is joined to the lower half, supported on the base fitting shown in Fig. 2. Note protective sleeve at point opposite joint in adjacent bus, and method of insulating metal spacers shown at top and bottom. Taps to the distribution panel for that floor are to be seen near the top spacer

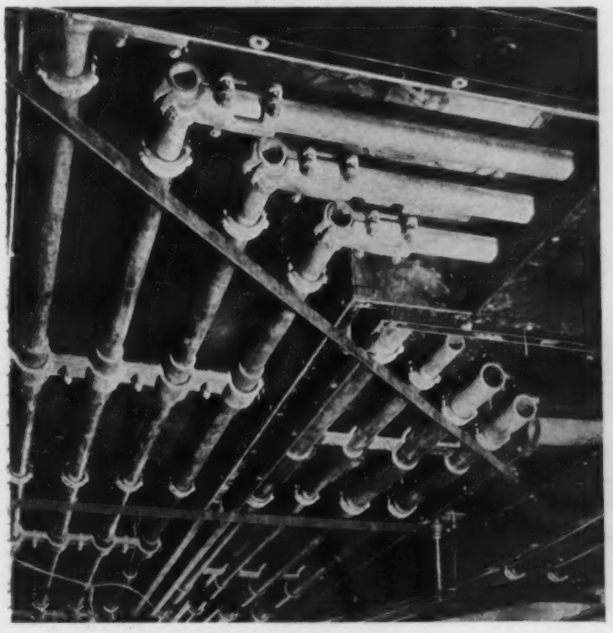
At each floor level standard insulators serve as guides as well as providing a rigid support for the bus run, another new feature.

The accompanying illustrations show various construction details which have been incorporated to meet the dictates of modern practice. An interesting feature of this layout is in the ventilated bus housing which exhausts into the ventilating system, the air warmed by the losses in the bus. The air is discharged through an opening in the bus housing as it passes through the ventilating intake air chamber in the basement.

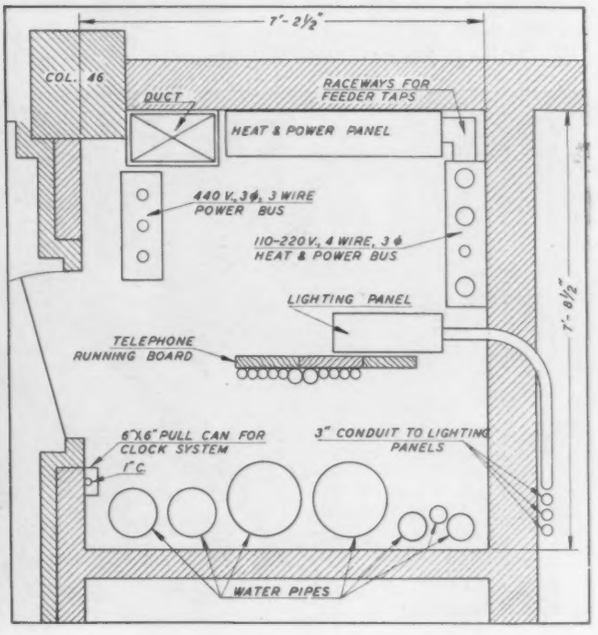
Right: Fig. 4. Method of supporting the upper half of the 3-phase, 4-wire heat and power bus



Below: Fig. 5. Construction view of tubular bus system showing method of making right-angle turns and installing spacers on horizontal basement runs



Below: Fig. 7. Cross-section of riser shaft adjacent to elevators at a representative floor level showing arrangement of the three bus installations with their corresponding distribution panels. High capacities and efficient space utilization are possible with this system



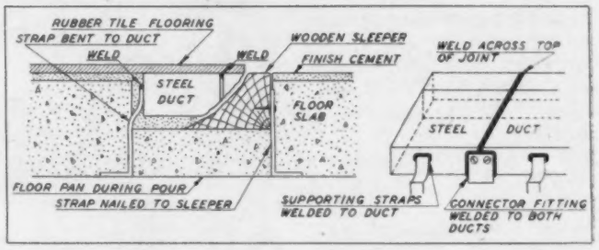
Left: Above the ceiling furring of every floor runs the elaborate and complete ventilating and air conditioning duct system of sheet metal. In the floor is the electrical duct system. Because of the special nature of the flush type of underfloor duct required by the engineers, grooves were left in the floors as they were poured, into which the duct was later set and grouted in. The floor shown in this picture was of monolithic construction, while most of the floors were constructed with a rough slab and a ¾-in. finish. With the monolithic type of construction, according to the contractor, difficulty was experienced because the previously poured concrete, despite all precautions, was not as true in line as the steel duct later introduced in the grooves. Some slight bending of the duct and polishing down of the surface had to be resorted to in order to bring duct and floor to a smooth finish

Underfloor Duct System

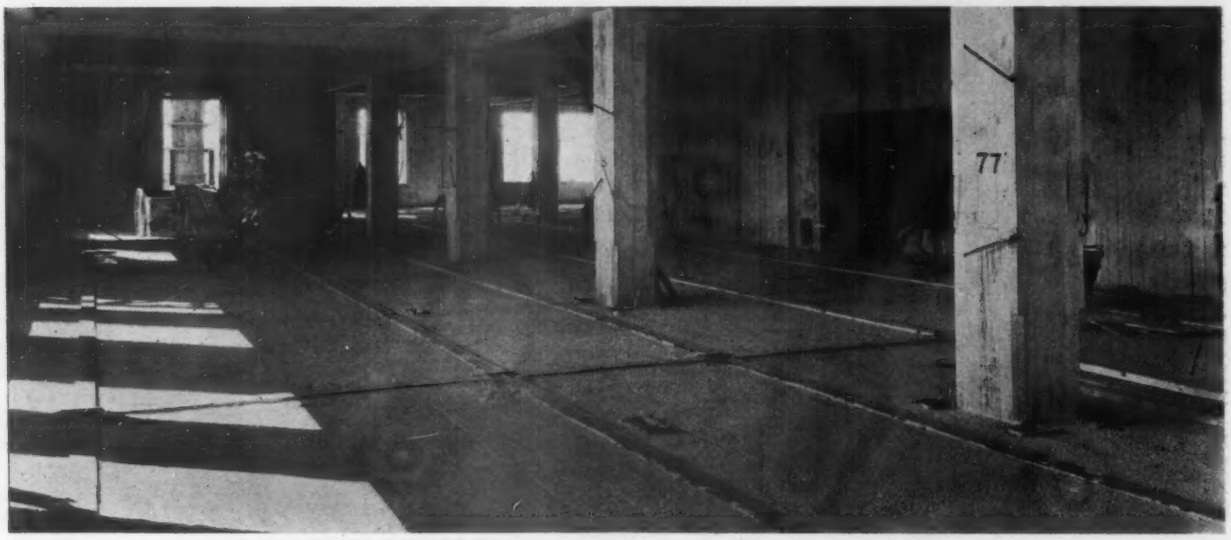
IN ADDITION to a duplex convenience outlet approximately every 9 ft. on all outside walls, and two on every column, a complete system of underfloor duct is installed in the new Edison Building.

Because of the large amount of reinforcing steel in the floor slabs it was necessary to design a special type of duct, including junction boxes and fittings, which could be installed flush with the finished concrete floor. Duplex steel duct was used, one section for power and one for telephone and signals. The two sections were spot welded together. They were of special manufacture with square edges on top so that the concrete could be neatly finished to the top of the duct, giving a smooth surface for the finished floor.

Three floors were of monolithic construction, raceways



Above: Diagrams showing installation method on ordinary floors. Before the concrete pour of the floor slab, wooden sleepers, supported on metal straps shingle-nailed to the sleeper, were set to correct height to approximate the finished floor. The supporting straps were nailed to the floor pan. After the pour, the sleeper was removed, the steel duct inserted, and the sleeper support straps were bent over and electrically welded to the duct, which was set to perfect level with transit. Grouting was poured around the duct, and using the duct as screed, the finish cement was poured. At the right is shown how ducts were butted together and welded. Sections were cut, assembled, connected by strap fittings, screwed tight and welded before being put in the space left by the sleeper in the slab

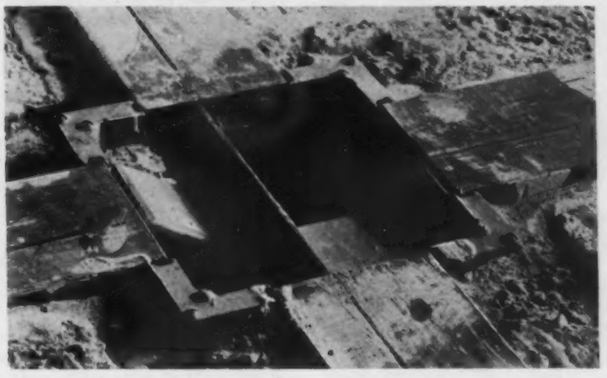


being left when the floor was poured and the duct grouted in later. On all other floors the duct was leveled with a transit and grouted in raceways left in the rough slab. The diagrams and photographs illustrate details of the installation. The finish floor was then poured to these ducts, this arrangement greatly facilitating the finishing and leveling off of the concrete.

No pre-set outlets are provided, a special motor-driven tool being used to drill openings at any desired location. The outlet fittings are expanded into the duct openings, and are further supported with a flange which screws down against the floor covering.

Not only in electrical installation, but in installation methods, is the Edison Building thoroughly modern. The electrical contractor, H. H. Walker, placed the most up-to-date machinery at the disposal of his superintendent, Art Kirsten, and his crews. Besides having his own portable arc welding set on the job for the duct installation, portable grinders, portable drills and tools, a "power mule" for driving large threading dies, a power hack-saw, a transit, and other tools were used. Oxyacetylene torches were used to cut metal, and job organization prepared most of the material cut to length, threaded, accompanied by fittings, at the contractor's yard, and delivered it to the job as needed. After a test of the new basket type wire-pulling grips, they were used throughout the job with considerable saving of both time and wire. Because of the tubular bus system, no large conduit was used extensively, but on the other hand the great volume of electrical detail in this so completely electrified building called for skill and good management.

Above: Finishing the floor with rubber tile. Underfloor duct can be seen in the cement floor with the junction boxes, each of which has a ring adapted to the height of the flooring. Only a neat brass circle shows in the finished flooring



Left: Junction box of the underfloor duct two-channel system before the finishing coat of cement had been poured. The duct has been grouted into the precast groove left in the floor slab. Note the cross-over partitions in the junction box

Below: A typical outlet fitting, expanded into a duct opening previously bored by means of a special tool. This fitting is supported further by the flange which screws down against the floor covering

Left: Underfloor duct before the finishing coat of cement had been poured. Ventilating duct outlets are to be seen projecting up from the floor also

Right: Underfloor duct, previously adjusted to exact level and grouted in the rough floor slab, acted as a screed to which the concrete floor was finished. The duct is a double raceway system and is used for both telephones and power to office machines

Lighting

NATURALLY, a building of the Edison type calls for the finest lighting installation. With the thought of efficiency and comfort, fixtures were selected not only to obtain the proper intensity, but also to get the proper quality of illumination. To this end, a series of tests under working conditions was made by the department of engineering design to find: First, the intensity necessary; second, the proper type of lighting; third, the most satisfactory type of fixture from efficiency and maintenance standpoints; fourth, that combination of the first three which would result in the best general effect on the worker.

The most severe lighting requirements were to be met in the drafting rooms; some contended that it would be impossible to provide illumination for close fine work without table lamps. Therefore, six drafting tables were installed in a 16 x 20-ft. room with a 9-ft. 5-in. ceiling, and sixteen tests were made, each covering from one to several days. Semi- and total-indirect fixtures of different makes were used with four and six units in the room. Workers then made observations on a form stating reactions to shadows, intensity, glare, reflections, eye strain, appearance, ceiling brightness, and general effectiveness. Intensities up to 55 foot-candles were tried, but the most satisfactory was an installation of four total-indirect units giving 30 foot-candles on the working plane.

As a result of this work, it was decided to use, in general, total-indirect units in larger offices and working areas and semi-indirect units in the smaller offices. Minimum intensities were to be 15 foot-candles for general lighting and 30 foot-candles for the drafting rooms. The exceptions to the indirect and semi-indirect lighting are in the medical department and in the blueprint room, where daylight-type enclosed units are employed.

The first floor is featured by a large columned concourse with a 30-ft. ceiling extending across the entire front of the building. Semi-indirect bronze luminaires are hung between the columns and are designed to fit in with the architectural treatment. Fourteen spotlights are concealed above the ceiling and in the beams. These may be used for color effects on the columns and walls, for spotting the mural paintings, or for special features set up in the lobby. A double layer of glass consisting of flashed opal inside and light amber bubble glass on the outside is used in most of these luminaires. Four watts per square foot are installed in the lobbies and 6.4 watts in the commercial and investment departments on this floor, with wiring capacities for increased load if desired.

Type of indirect unit used extensively, with reflector

Because of extensive ventilating ducts, the ceilings are very low above the first floor, half being 9 ft. and half 9 ft. 10 in. In addition, all ceilings are treated with an acoustical plaster of rough texture which, while it has a high reflecting value, tends to make the overhead appearance of a lighted area more spotty than would a smooth surface. Columns in the building are spaced 17 x 19 ft. and 19 x 19 ft. and not less than four outlets are installed in each of these bays. Switches, for the most part, are located on columns, each controlling two outlets, the pair nearest the windows being on one switch. Each office with dimensions of 15 x 15 ft., or over, and this includes all but three or four, has four outlets. Lamps used throughout the general office section of the building—mezzanine to eleventh floors—are 300-watt inside-frost, giving from 3.3 to 5 watts per square foot, depending upon the size of areas or offices. The two drafting rooms, in which 500-watt inside-frost lamps are used, have an average of 5.7 watts per square foot. The use of this type of lamp gives a much more

In the drafting room, where lighting requirements are most severe, a special indirect unit was designed inside of which was mounted the standard reflectors. Five-hundred-watt, inside frost lamps are used, an average of 5.7 watts per square foot, to give a 35 to 42 foot-candle intensity

At night—
Changing colors and intensity

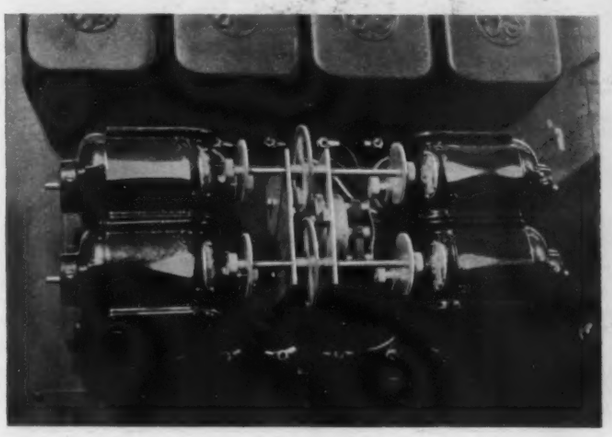
satisfactory appearance, even with a ceiling of very rough texture.

The general lighting fixtures are of several types and from a number of manufacturers, all supplied according to the specifications of the Southern California Edison Company Ltd. All units have rigid stems, with ball and socket joint at the canopy. The indirect types are designed with an adjustment for the position of the reflector, and completely conceal the lamp. The bowls and socket husks are porcelain enameled to resist the heat, and are finished in a light ivory shade, while the hangers of the semi-indirect units are finished in a light brushed nickel, both of which blend harmoniously with the ceiling. A number of readings have been taken in various parts of the building since the installation was completed, and the intensities on the working plane run from 15 to 18 foot-candles in the larger offices, and up to 23 in those less than one bay in size. The illumination in the drafting rooms runs from 35 to 42 foot-candles; at this intensity it mixes with daylight satisfactorily.

Lighting service in the building is at 120/208 volts, 4-wire, 3-phase, with a separate 115/230-volt single-phase service for emergency lighting. The total loads, exclusive of all convenience and power outlets, are: General lighting, 750 kw.; emergency lighting, 80 kw.; floodlighting and sign, 225 kw. No-Fuze type distribution panels are located on each floor in a central riser shaft and all conductor is No. 12 or larger. The gross floor area of the building is approximately 269,000 sq.ft., giving 3.08 watts per square foot average installed interior lighting.

▼

Electric-clock driven regulators which control the mobile cycle. Gears may be changed to alter ratio



Floodlighting

THE architectural design of the building lends itself easily to floodlighting, with a 3-ft. setback at the third floor and 20-ft. setbacks at the fouth, twelfth, and thirteenth-floor levels. This adds to the effect of a mobile cycle which will give a changing effect in intensity and shadows with the use of several colors, or with a single color, or with white. This is accomplished by having two sets of floodlights at each 20-ft. setback, one located close to the building at the base of the wall to be lighted, and one at the outer edge. All units are mounted on pre-cast concrete bases, and connections are of sufficient length to permit shifting the location of the lights, giving added flexibility to the installation.

Yet, the most attractive mobile cycle, if repeated over and over, soon loses its value, so a regular schedule will be worked out in order that the building's appearance will not be the same any two weeks in the year. Changes can be effected by shifting the position of steady units, changing color lenses, changing the wave shape of the mobile cycle, changing the time of the cycle, setting various circuits to come on at different times, having all mobile cycles the same wave shape, each cycle a different wave shape, all cycles the same length, and so on almost without limit.

Color lenses of Pyrex glass are used, inserted behind the permanent clear outer lens, and so installed that they can be readily removed without tools.

Advantageously utilizing the innumerable color effects

Floodlight section of main switchboard

obtainable from a well designed, mobile floodlighting installation requires a smooth, dependable, and flexible control system. In this building, the control for the nine floodlighting circuits is concentrated as an integral part of the main switchboard. Briefly, the alternating current output of each of the five reactor banks supplying the mobile lighting circuits is controlled with the direct current output of two Thyratron tubes. By varying the voltage applied to each pair of tubes through the use of a small voltage regulator, their combined output can be regulated between maximum and minimum limits, which produces corresponding changes in the reactor output of that circuit and thus changes the intensity of the illumination of the lights connected to it. In this installation, each mobile floodlighting circuit is provided with three such regulators, each of which permits a different cycle of operation, one providing manual control of the circuit, and each of the other two providing a separate cycle of automatic control, one being driven at a different synchronous speed from the other. Group drive of eight regulators is accomplished by four Telechron motors, as shown.

Control equipment and its convenient and compact installation on the main switchboard are illustrated on page 245. The glass screen, identified as A, conceals an indicating lamp for each mobile circuit, enabling the operator to compare simultaneously the degree of illumination of all mobile floodlights. Immediately below this are five indicating lamps, one for each of the steady circuits. Points C, D, and E identify Thyratron tubes, relays, and synchronous-driven regulators which have been described before.

Through a group of pre-set switches, the interval during which each circuit is energized is controlled by the eleven time switches indicated as G. These permit presetting of any circuit so that it can be energized or deenergized at the desired time, and also enable a variation in the length of a mobile cycle. Provision is also made to shift the mobile circuits from one speed to another, each mobile circuit being capable of independent operation at either of two speeds. Further variations in lighting effect are obtained through the potentiometers, indicated by I, which adjust the wave shape of the mobile cycle over wide limits. Any or all of the mobile circuits may be varied from a 1.2-min. to 30-min. length of cycle. When once it is set up, the entire operation of the system is automatic and requires no attention until a change is desired. Manual control of the mobile cycle is provided by four dials located immediately below the time switches.

Floodlights have heat resisting color lenses

All the necessary equipment for controlling the lower circuits is located at the main switchboard in the basement, while the corresponding equipment for the upper circuits is located in the penthouse, connections between the two requiring a few small control wires.

With this installation the total load is 242 kw., the wattage per square foot on the main part of the building is 3.5, on the upper setbacks 5, increasing to 7 watts per square foot on the penthouse.

Incorporating, as it does, almost every feature that could be desired for ease of operation, flexibility, maintenance, and economy, this installation is undoubtedly one of the finest and most complete ever made.

Bank of units on portable concrete bases

If Miniature Golf Dies, What Takes Its Place?

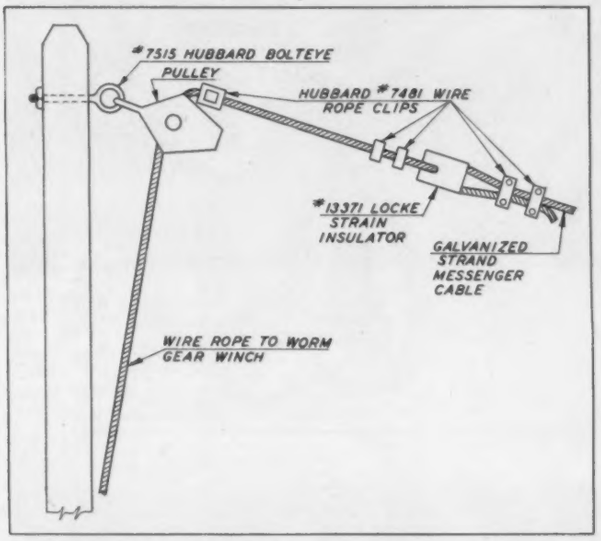
In 1930 It Was Golf— In 1931 It Will Be a Variety of Sports

By F. B. NIGHTINGALE
Illuminating Engineer, General Electric Supply Company, Los Angeles

PEOPLE of the United States generally, and of the West specifically, have not suddenly become sports conscious. Rather, Americans have always been lovers of games; the success of American participants in international sports competition is evidence of this interest. Yet, until recently, Americans had abandoned their participating spirit for that of the onlooker. With the passing of youth, the more serious aspect of work during daylight hours had discouraged participation in sport by the average business man.

Now, with outdoor illumination, which turns the hours of play into daylight, Americans have become almost unanimously participants in some type of outdoor or indoor sport. The miniature golf craze first showed the large-scale trend.

With the coming of summer and climatically better times in the West, the public will again turn outdoors. Sports under the midnight sun will probably be more popular this year than last, for the sportsman or sports woman will be glad of an opportunity to have his or her mind occupied elsewhere than on business worries.


#7515 HUBBARD BOLTEYE PULLEY
HUBBARD #7481 WIRE ROPE CLIPS
#13371 LOCKE STRAIN INSULATOR
GALVANIZED STRAND MESSENGER CABLE
WIRE ROPE TO WORM GEAR WINCH

Method of mounting units on ground and raising into place. Units are strung along messenger cable (ELECTRICAL WEST, *Sept. 1, 1930*)

Thousands of acres of land representing a public or private investment of millions of dollars are devoted to playground and recreation areas. Perhaps the benefit of outdoor sports to the Western people cannot be estimated in money, but a great loss in investment and a greater loss in benefits to health come from the lack of or meager illumination for night play. By introducing proper lighting, these grounds would be filled with those seeking healthful outdoor recreation at the most ideal time of day, the cool evening.

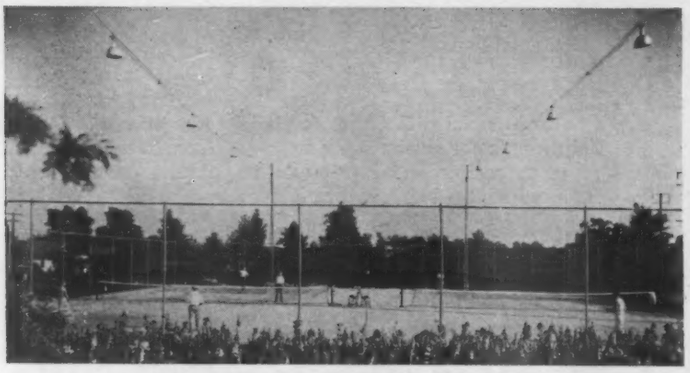
Many cities are beginning to realize that, besides being a health measure, night playground illumination is also a social obligation to the future citizens. C. M. Johnson, chief probation officer of Kern County, Calif., in commenting on an installation at the county seat, Bakersfield, said in a recent letter:

> We have something over 5,000 children within the corporate limits of our city and these children profited to a very great extent, morally and mentally, by the night ball games which were promoted during the past season.
>
> As a class of people we are inclined to divide our day up into three parts: Eight hours for sleep, eight hours for work, and eight hours for relaxation or play. The average adult, with his or her mature years and stability, is able to use the play period profitably, but the average boy or girl, without stability and without some means of controlling his surplus energy, is not apt to use this play period profitably.
>
> It is during this period that 95 per cent of the delinquencies among young folk under the age of 21 years occur. I am impressed with the fact that our records show that during eight years in which Judge Owen has been judge of the Juvenile Court, in only three instances have Boy Scouts come before the court. Personally, I feel that this splendid record on the part of the Scouts is not so much due to the character of the organization, as to the fact that a Scout has something to occupy his leisure hours.
>
> During last season the percentage of delinquency in the corporate limits of Bakersfield was materially reduced. During the summer months I visited the poolhalls in the evening on many occasions and found without exception that there were very few, if any, boys loafing about them. I am certain that the improved conditions in Bakersfield during the past summer months were due to a very great extent to the fact that we had provided recreation for them in the form of watching and participating in the clean and wholesome night baseball games.

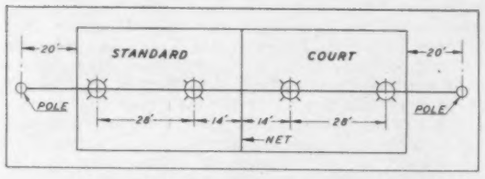
Artificial illumination has several advantages over daylight. The sun is constantly changing both in location and intensity, but artificial light sources are permanetly located in the most advantageous positions. Illumination of the desired intensity may be produced and constantly maintained over the playing area.

High mounted units are the proper method of artificial illumination, yet the contractor-dealer himself so far has been the one who has blocked the furtherance of this work, because of his lack of knowledge of the suspension equipment and his desire to keep both feet on the ground. This antipathy need not be, for all equipment may now be assembled on the ground and raised into place as a unit with block and tackle. An accompanying drawing shows one such method. There is nothing to hamper the intensive drive toward outdoor illumination; it is the field that lies before the electrical contracting industry this summer.

Typical badminton installation described on page 248



Standard installation on double tennis court



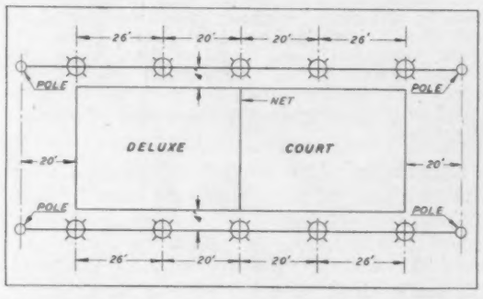


Diagram showing two proved methods of illuminating tennis courts. For double "de luxe" wiring, only three strings are needed; this wiring is suitable for championship play if lamps of the proper size are used

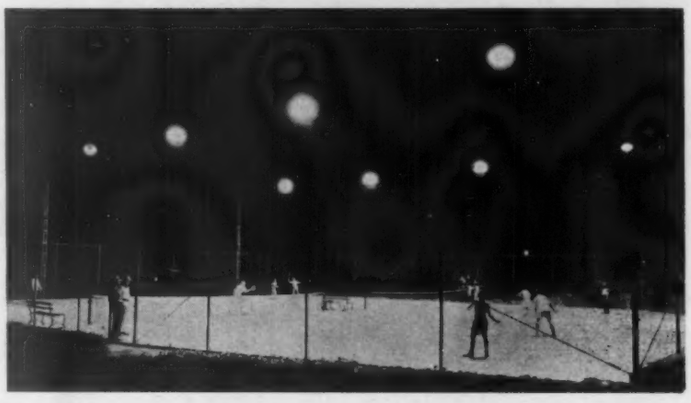
Tennis and Badminton

WITH the passing of the miniature golf craze, many courses may profitably be turned into grounds for other sports, among them tennis and badminton.

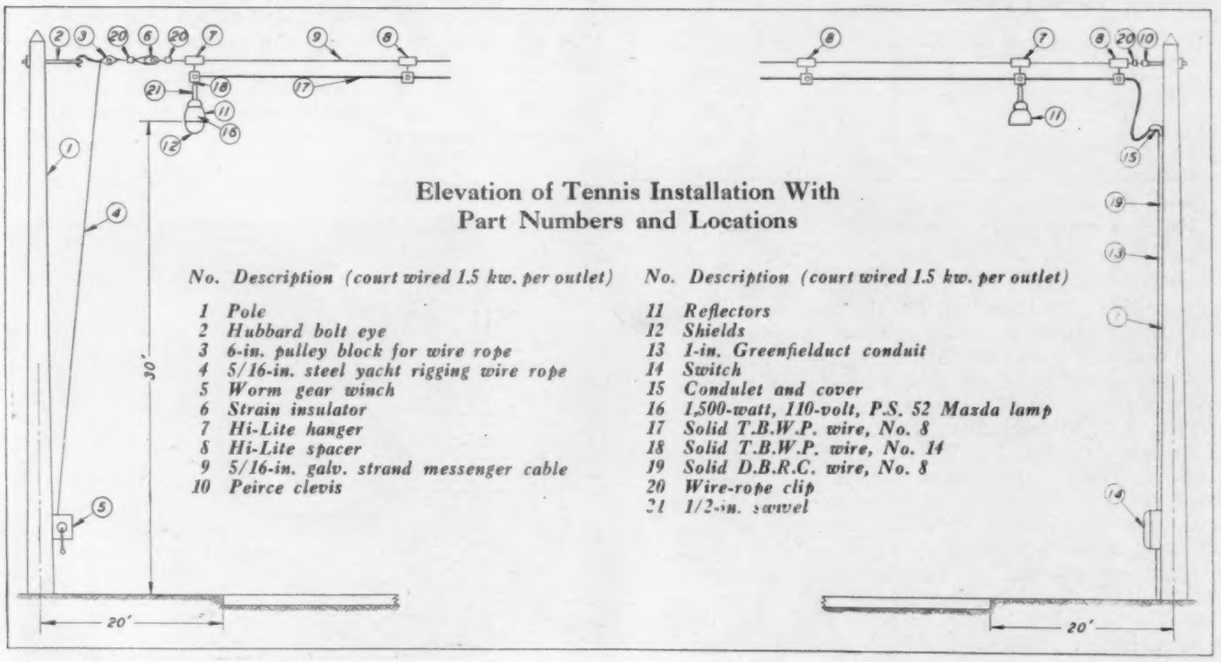
Two tennis installations are approved, the standard court based upon a minimum investment, and the championship *de luxe* court. The former uses four reflectors with 1,500-watt lamps mounted 30 ft. high and spaced as shown. The latter court uses shields on ten reflectors with 1,500-watt lamps, also mounted 30 ft. high. For two courts, a *de luxe* installation uses one row of five lights on both sides and one row in the center. Wiring should be designed for 2,500-watt lamps, should this be needed for championship play.

Badminton, an increasingly popular game, is played on a smaller court. Illumination is provided by suspending two deep-bowl reflectors with 1,000-watt lamps 25 ft. above and 5 ft. in from the ends of the court.

An idea especially suitable to public courts would be to install a prepayment meter, so that if a player deposits a coin he receives illumination for a period of time without expense to the club.



Night view of courts pictured above. Little glare and practically shadowless light mark this method of lighting



Elevation of Tennis Installation With Part Numbers and Locations

No.	Description (court wired 1.5 kw. per outlet)
1	Pole
2	Hubbard bolt eye
3	6-in. pulley block for wire rope
4	5/16-in. steel yacht rigging wire rope
5	Worm gear winch
6	Strain insulator
7	Hi-Lite hanger
8	Hi-Lite spacer
9	5/16-in. galv. strand messenger cable
10	Peirce clevis
11	Reflectors
12	Shields
13	1-in. Greenfielduct conduit
14	Switch
15	Condulet and cover
16	1,500-watt, 110-volt, P.S. 52 Mazda lamp
17	Solid T.B.W.P. wire, No. 8
18	Solid T.B.W.P. wire, No. 14
19	Solid D.B.R.C. wire, No. 8
20	Wire-rope clip
21	1/2-in. swivel

Roque and Bowling-on-the-Green

ROQUE is a form of croquet played on a well rolled dirt course slightly sprinkled with sand. Thus, in illuminating a roque court it is not advisable to suspend wires or reflectors over the course, because rain dripping from them will so pock-mark a course that resulting sand-pockets will turn a ball from its true course. Suspensions should be over walks and runways between courts. A minimum of four deep-bowl reflectors with 750-watt lamps mounted 25 ft. high should be used for a single court.

Bowling-on-the-green is becoming the most popular night game for men of middle age. The most successful and yet the cheapest installation is one using nine 1,500-watt lamps in deep-bowl reflectors mounted 25 ft. high. In each string of three lights one is at the center and is flanked 40 ft. on either side by another. One string is placed over the center line of the court and is flanked at 40 ft. by the other strings.

Track, football, baseball, swimming, shooting, handball, and horseshoes are a few other sports that are fast succumbing to the lure of night illumination.

Above: Nine units mounted 25 ft. high give ample, yet glareless and shadowless, light for this popular night game of bowling-on-the-green

Below: A roque installation is similar to the "de luxe" type of tennis court lighting. Units are placed on walks to the side of the court, giving sufficient light. This game also requires perfect light distribution.

Left: Using sixteen units, but mounted only 20 ft. high, this installation, while giving enough light, produces startling glare, as may be seen

Lobby entrance to sales department, first floor

Edison Building Is Sales Laboratory

Building Equipment Designed to Demonstrate Many Types of Lighting and Electric Heating Equipment Under Actual Operating Conditions

OFFERING complete facilities for the demonstration, under normal operating conditions, of the most modern applications of electricity to large office building services, the new all-electric general office of the Southern California Edison Company Ltd. has, in effect, become a laboratory for the electrical industry of southern California. Facilities also have been provided in the thirteen-story building for the display, demonstration, and sale of electrical household appliances, all in the sales department quarters on the main floor. Here, also, is a model electric kitchen.

The appliance sales room contains complete displays of both large and small appliances, including ranges, refrigerators, water heaters, washing machines, ironers, portable heaters, and a dishwasher. Numerous convenience outlets in the walls, floors, and display cabinets have been provided for convenient demonstration of the various appliances. A customers' counter and desks for persons transacting business occupy a portion of the room.

Display cabinets in the lobbies and the model kitchen, equipped with two types of electric ranges, a refrigerator, a dishwashing machine, and a number of small kitchen appliances are the remaining commercial features of the first floor. The entire second floor is given over to commercial department offices and includes a large room utilized as a conference room by the department and as a room in which group meetings of representatives of other branches of the industry in southern California may be held.

Representatives of virtually all branches of the electrical industry in and about Los Angeles, as well as architects and builders, are availing themselves of the company's standing invitation to study the building's complete and diversified electrical installations, such as

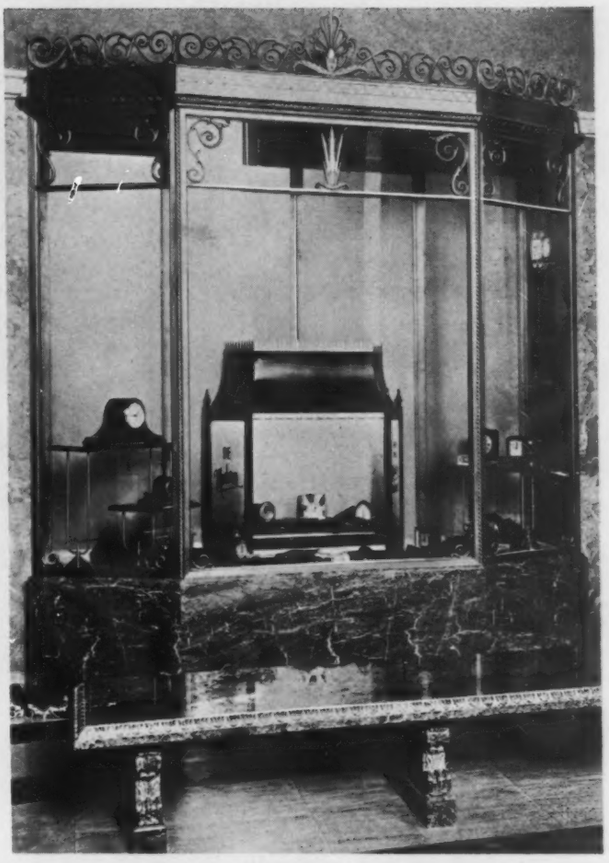
the air heating, ventilation, lighting, and communication equipment. Data pertaining to the various electrically driven utility services, gathered during the period when the building was being planned and under construction, also are available.

Lighting and air heating installations in the building lend themselves particularly to demonstration and study and are especially interesting to dealers and contractors who wish to study effects and possibilities for future building reference.

Seven types of lighting equipment have been utilized throughout the building. Three types of indirect luminaires, the X-Ray, Pittsburgh, and Guth, are used on the various floors of the general offices, and two types of semi-indirect, the Holophane Filterlite and Duplexalite, are utilized in the private offices. The main entrance lobby and the executive offices are equipped with special fixtures. Rooms of the medical department have been provided with the Celestialite enclosing globe direct luminaire, the color correction approximating daylight. This type of illumination also is used in the blueprint rooms. The basement garages and building maintenance shops have Holophane direct open reflectors and Holophane reflector-refractors.

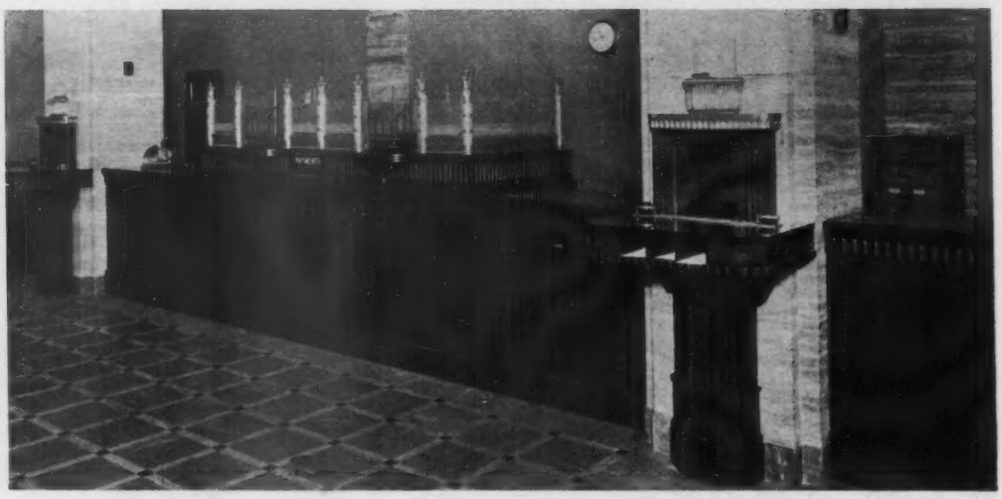
While the installations of lighting equipment are varied, the equipment on each individual floor is of the same type, providing for uniformity and also enabling the demonstration of a complete unit of the particular type of luminaire. The commercial department conference room is fitted with facilities for the demonstration of individual lighting fixtures. Ceiling hooks and convenience outlets are provided for this purpose.

Installations of air heating equipment also are varied to provide a representative demonstration of the four makes of wall-type, thermostatically controlled heaters



Above: One of several "windows" in the lobbies of the building in which merchandise or securities advertising is displayed attractively for visitors

Below: A general view of the main display room looking toward the cashier's counter at the rear. In the immediate foreground is one of the several portable display tables with closed compartments below. In these compartments is kept extra stock and packaging for the appliances displayed on top, thus making a floor sale convenient and simple



The payment wicket in the commercial display room. Desk-stands for check writing are provided at each pillar. All customers must come through the display room to reach this counter and pay bills

for the building. These are the Hoffman, Hotpoint, Majestic, and Wesix. In addition to the four types utilized on the various floors throughout the building, one type being standard for a floor, Airway and Apfel wall-type heaters are installed in the appliance sales room on the main floor, with one each of the other four makes, thus providing six distinct brands of heaters for demonstration purposes. Each of the heaters may be operated independently.

Because the building is also a performance laboratory of the many makes of electrical equipment, records and charts are being kept of each individual piece of apparatus. Equipment and the many companies who supplied portions of it include:

Commercial lighting fixtures—Holophane, Duplexalite, Guth, Ivanhoe, Wagner-Woodruff units with X-Ray and Pittsburgh reflectors.

Floodlights—Crouse-Hinds.

Floodlight control—General Electric Thyratron tube.

Heaters—Majestic, Hotpoint, Wesix, Hoffman, Apfel, Airway.

Thermostats—Diamond Electric Company.

Heaters in ventilating system—General Electric.

Lighting switches—Hubbell.

Convenience outlets—Bryant.

Underfloor duct—Walker.

Lighting panels—Diamond Electric Company with Westinghouse No-Fuze.

Heating and convenience outlet panels—Diamond with Bulldog Saf-T-Fuse.

Switchboards—Diamond.

Circuit breakers—General Electric.

Watthour and recording wattmeters—General Electric.

Motors—Sterling Electric Company.

Elevators—Consolidated Steel with Westinghouse motors and control.

Temperature control in ventilating system—Leeds & Northrup.

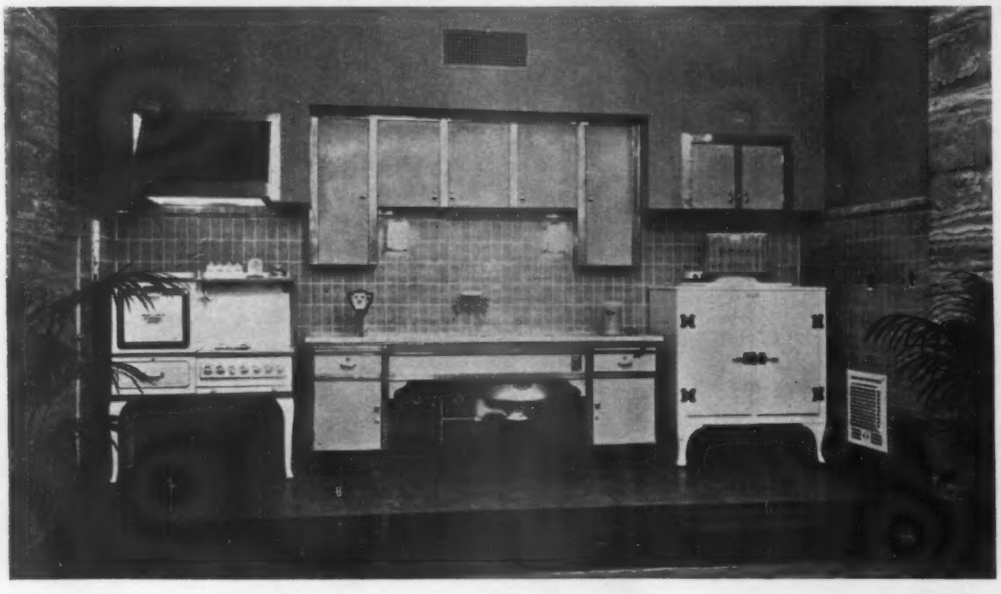
Tubular copper buses—Anaconda Copper Company.

Tubular bus fittings—Burndy.

Special lighting fixtures—Wagner-Woodruff Company, B. B. Bell Company, Roberts Manufacturing Company, Meyberg Lighting Fixture Company, Solar Lighting Fixture Company.

Refrigeration for drinking water—General Electric.

Refrigeration for ventilating system—B. S. Sturdevant compressors, Mechanical Heating Company reverse cycle apparatus.



A stage for electric home demonstrations occupies one side of the display room. Electric range, refrigerator, air - heaters, dishwasher, and other electric kitchen appliances are shown, and except for the dishwasher and built-in heaters, can be replaced with other models

Motors for refrigeration—General Electric.
Telephone system—Automatic Telephone Company.
Water-heating units—Wesix.
Ozonator for drinking water—U. S. Ozone Company, Radi Inc.
Ionizer for ventilating air—U. S. Ozone Company.
Clocks—Telechron.
Radio—Radio Corporation of America.
Neon sign—Electrical Products Corporation.

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Reducing Range Servicing Costs

By A. O. BORDEN
Range Service Department, Pacific Northwest Public Service Company, Portland

THE Pacific Northwest Public Service Company (formerly Portland Electric Power Company) has pioneered in the installation of electric ranges and has built up a substantial range load in the past ten years. Service facilities have been enlarged as necessary to provide adequate and satisfactory service for a rapidly increasing number of ranges; yet the annual maintenance cost per range has decreased more than 60 per cent since 1920.

It is obvious that electric range servicing costs have a direct bearing on revenue from the domestic cooking load; therefore, the comparison of annual maintenance costs, shown in the table on this page, covering a ten-year period, should be of interest to other central stations.

This decrease in servicing costs is chiefly due to:

1. Greater density of ranges, reducing the average time and mileage per service call.

2. Improved design and construction in ranges, resulting in fewer complaints. (In 1920 complaints averaged 2.1 per range; in 1929 1.35 per range.)

3. Efficient handling of complaints, facilitated by well-equipped service trucks, and service men specializing in range repairs. Range parts and material valued at more than $900 are carried on each service truck, minimizing the number of jobs turned back for lack of parts.

SERVICE ORGANIZATION

Range complaints are received by the repair department dispatcher, who also handles light and power complaints. Seven range service men at present report to the dispatcher; these men come on duty at hours ranging from 8 to 11 a.m., so that range service is available up to 7 p.m. without overtime. Because of the large stock of parts carried on each truck, it is seldom necessary for a service man to return to the shop before the end of the day's work. In addition to these seven men, one man takes care of special jobs requiring parts not carried by the regular service men, and work which takes considerable time, such as changing oven linings.

Installations and range connections are handled with two delivery trucks, each manned by a journeyman and helper. Ranges sold by local dealers are connected to the range wiring by these men, no charge being made for these connections.

Since 1925, replacement parts which are not covered

TABLE I
COMPARISON OF RANGE SERVICE COSTS

Year	Ranges in Service Dec. 31	Material Cost Per Range	Labor Cost Per Range	Cartage Cost Per Range	Total Cost Per Range
1920	782	$3.34	$4.54	(Inc. in material)	$7.88
1921	1,082	2.53	5.31	(Inc. in material)	7.84
1922	1,615	4.08	3.30	(Inc. in material)	7.38
1923	3,081	3.59	2.38	$0.66	6.63
1924	4,814	2.67	2.36	0.50	5.53
1925	6,707	1.73	2.11	0.47	4.31
1926	8,620	0.73	1.92	0.48	3.13
1927	10,402	0.47	1.87	0.39	2.73
1928	11,914	0.39	1.87	0.39	2.66
1929	13,825	0.38	1.69	0.30	2.37

TABLE II
RANGE SERVICE AND INSTALLATION COST—1929
RANGE MAINTENANCE COSTS

Ranges in Service Jan. 1, '29	Jan. 1, '30	Average In Service	Increase	Labor Cost	Material Cost	Cartage Cost	Total Cost	Total Cost Per Range
11,914	13,825	12,869	1,911	$21,807.78	$4,905.59	$3,829.72	$30,543.00	$2.38

COMPLAINT COSTS

Complaints Received	Complaints Per Range	Labor Cost Per Complaint	Material Cost Per Complaint	Cartage Cost Per Complaint	Total Cost Per Complaint
17,385	1.35	$1.25	$0.28	$0.22	$1.75

INSTALLATION COSTS
(Company Deliveries only)

Ranges Installed 1929	Labor Cost	Material Cost	Cartage Cost	Total Cost	Cost Per Installation
1,289	$7,964.00	$1,731.22	$820.53	$10,515.75	$8.15

CONNECTION COSTS
(Dealer ranges only)

Year	Total Ranges Installed	Labor Cost Per Range	Material Cost Per Range	Cartage Cost Per Range	Total Cost Per Range
1929	$1,049	$2.57	——	$0.37	$2.94

Inside of a service truck. These trucks carry range parts and materials worth $900

by the manufacturer's guarantee have been charged for, although no charge is made for service. Prior to 1925 no charge was made for parts, labor, or cartage. The company services all approved makes of ranges on its lines, regardless of whether they are sold by the company or not.

A modern card file system is used, containing a service record card for every range in service. Each service call made is entered on this card, and cards are filed by address, under street name. The possibility of error in checking repair reports for billing is reduced by a numbering system, which involves the attachment of a numbered metal plate to the frame of each range. This plate is installed at the time of connection, and provides a positive and permanent means of identification.

A "repair report" form is filled out by the service man for every job completed, and when material is installed this report is made out in triplicate and signed by the customer. If the customer is billed for the material, a copy of the repair report is mailed out with the invoice.

Table II contains parts of the preceding table broken down for analysis. In this connection, it may be noted that in 1928 the cost of connecting ranges from outside sources was included under service costs, but since 1929 a separate cost classification for these connections was established, as shown under "Connection Costs." A charge of $1 is made for connecting ranges other than new, and the revenue from this source, being credited to material, has balanced the amount charged under that heading.

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"Let the Dealer Make the Deal"

Says an Arizona Appliance Representative Who Believes That the Dealer, and Not the Manufacturer, Best Knows His Territory

AN ARIZONA appliance distributor, W. C. Lefebvre, of Majestic Products, Inc., Phoenix, has definite ideas about quotas and how they should be made. He contends that the matter should rest entirely in the hands of the dealer and his salesmen, and that the factory should have no say unless the distributor is found, upon investigation, to be selling too few appliances in a territory where it is definitely known that more can be sold. In substantiating his beliefs, he says:

"Make an intelligent survey of any merchandising field, and, consciously or unconsciously, you establish in your mind a quota for that field. You estimate about how many units that territory will absorb within a given time. If your survey includes the records of past activities in that field, your estimate will be influenced to some extent by the salesmanship of the men who have covered that field in the past; if you are entering a new field and are without past records, your estimate will be influenced somewhat by your hopes and fears.

"It is perfectly right that these factors should enter into the setting of a quota, but it is important, too, that they should be seen at their just values. The factory never knows local conditions, because conditions change so rapidly. Therefore, any factory-made quota is misleading, unfair, and bound to be wrong in principle and in practice. It is costly, too."

Mr. Lefebvre opens his new dealership with a contract that enables him to get just what he wants when he wants it and to sell it where he will as he will. His line includes radios and refrigerators and his territory includes all of the state of Arizona.

"Any method of distribution that puts goods into a territory faster than that territory can absorb that quota is a costly method in the long run," he says. "Some one must pay for the storage, insurance, and repeated movement of goods that are piled up at the wrong point at the wrong time. The method that tends to make the dealer hold back from ordering goods that he begins to see a market for, or that loads him with a wrong proportion in styles and models, is costly. The quota system is responsible for all of those things."

As Mr. Lefebvre sees it, the factory must face the loss in this method of distribution and decide whether sufficient compensation results from being able to lay out a year's production in advance. But certainly, he thinks, the dealer should not be shouldered with the risk and should refuse point blank to accept it.

"Mass production is the manufacturer's problem," he says.

"If the factory I am selling for simply keeps pushing goods along to me by its conveyor system and if I am as efficient a salesman as the company is a producer, I am going to push my sales over into adjoining territory. By hook or crook, I am going to find a way to gain an outlet for those goods, just as the factory finds a way to enter foreign countries. If a tariff is raised against them, they build factories inside the tariff walls. That is all very well, if that is the policy they have laid down for themselves, but the wise dealer will not put himself into a position where he will be forced to establish agencies in outside territory.

"The dealer does enough when he makes himself thoroughly acquainted with immediate conditions within his own territory; the wise dealer makes himself arbiter and master there."

It is a mistake, thinks Mr. Lefebvre, for the dealer to be so influenced by the factory's idea of gross volume as to lose sight of the one factor essential to the dealer's success—net profit.

"The dealer can no longer afford to go out into his territory with a bell-ringing campaign of high-pressure salesmanship for the mere sake of obtaining volume. What he must do is study his district and follow the

immediate changing conditions month by month, with a view to giving his patrons the service that will best meet their wants and their abilities to pay. Then he can intelligently stimulate their wants."

This dealer takes the position that the dealer too often directs his attention to stimulating his customers' wants without first having a definite idea of those wants and of the customers' ability to pay.

"Too much reclaiming results from this kind of mistaken promotion, but reclaimed merchandise is only one of the evils of the case," according to his analysis. "A worse result is the failure to enter certain high-class fields that are right at hand. The careful dealer is not necessarily a pessimist; far from it, he is usually the sanest kind of optimist for he is the dealer who will discover the field for goods of higher and higher quality. Big quota assignments always result in too much enthusiasm over volume selling."

Mr. Lefebvre very decidedly thinks that the dealer, with his local records, his hopes, and his fears, is in the best position to make out the orders for his territory. He declares that the trouble with the quota system is that some expert, juggling with theoretical figures, adds some percentage to price or volume at the beginning of every season and it throws out of balance every calculation the dealer has made from his actual experience in his field under definitely known conditions.

"But I do make out a quota for each of my salesmen and I help him to make it. The difference is, I study to understand local conditions; if conditions change, I change the quota. In the end he is never left with the unsold merchandise on his hands. The manufacturer stands at one end of the line and the salesman at the other; the dealer stands in between. And the dealer ought to make the deal."

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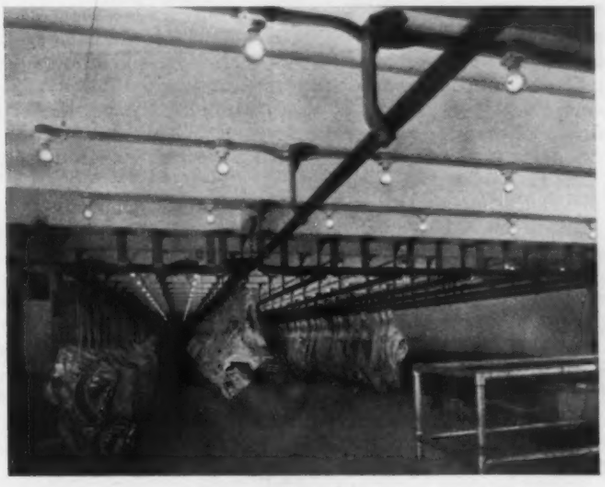
Not a Shadow in The Show Room

WHEN the Lindner Packing Company at Denver planned new quarters, following a fire that gutted the old plant less than a year ago, electric equipment incidental to operation of machinery was a major consideration. Of equal importance were illumination details.

In the old establishment the lighting system left much to be desired. Large units of 100 watts each had been scattered about in the sales cooler in such a way that one side of a beef quarter would be in the glare while the other exposure was so shadowed that the customer had to guess its quality.

New "between the racks" installation



To correct this condition, M. F. Price, of Denver's Reliable Electrical Company, was called into consultation. His recommendations were adopted and now a customer cannot find a shadow in the show room.

Instead of 100-watt lamps, Mr. Price installed 25-watt units, but he placed them at 30-in. intervals *between* the meat racks instead of a dozen feet apart *above* the racks. As a consequence, the sales cooler enjoys perfect illumination without any increase in actual candlepower or added expense for current.

An interesting feature was the use of Appleton threadless fittings, with cork gaskets, instead of conduits for the 30 per cent rubber wire. Each row of lamps is controlled by two switches. Half the length of the room may be illuminated as need arises, or lights cut off when not required. Some 287 outlets serve the sales cooler.

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Sell Refrigerators to Mountain Lodges

ENTERPRISING and forever looking for new promotional ideas is the Southern Oregon Electric Company, of which M. B. Leonard is president and H. O. Frohbach is secretary-treasurer. Stock in the store is continually being changed around, although ten ranges are always kept on the floor. Accessible arrangement of stock leads to better service. Windows are kept lighted all night for the store is on the major Coast highway. Recently, they staged a campaign to fit fishing and hunting lodges with electric refrigerators for the preservation of game before shipping. A large number of clubs have installed counter refrigerators such as are usually found in meat markets.

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TO PROVE THAT his promise that a new General Electric refrigerator installed in a store would increase the merchant's business, A. C. Patterson, Utah Power & Light Company salesman, printed dodgers with the information that fruits, vegetables, and meats sold by these stores were now kept perfectly fresh in the new refrigerators. These he distributed in the vicinity of the stores, and soon marked increases in the volume of sales for the stores were evident. Such resourcefulness is indispensable to a good salesman.

Ferris-ing Out More Customers

MOVING people with a Ferris wheel has been common for years, but moving appliances with one is a recent idea of W. L. Moore, manager of the Dear Electric Company, of Alhambra, Calif.

Some new window idea was needed, so this dealer constructed a miniature carnival wheel with six carriages on which were placed clocks, flatirons, toasters, egg-cookers and similar appliances. He set the wheel in a window, and watched the people stop, look, and buy.

The polished brass contrivance is about 3 ft. 6 in. in diameter, the gear ration being such that it turns 3½ revolutions a minute by means of a 1/50-hp. motor. The base is of 2-in. pipe covered with sheet brass, the two standards are of 1-in. square brass tubing, and the spokes of the wheel are of ⅝-in. square brass tubing. The bearings are from Ford generators. Each spoke terminates with a Christmas tree light socket and a colored lamp. Carriages are of 3-ply veneer wood covered with sheet brass. The clearance for the carriages is such that articles 15 in. high can be displayed.

All wiring is in the hub and leads out through a hollow shaft of ½-in. Shelby tubing covered with a larger brass tube. The wires are brought to a collector ring made of Bakelite and two brass rings on which two spring contacts ride.

While this wheel cost its maker $65 in materials alone, a wheel just as practical could be made of steel tubing and a less expensive motor for about $20. "It doesn't take long for the machine to sell $20 worth" Mr. Moore says.

Dear's newest merchandise-mover

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Action Moves the Red Tag Washers

EACH February, the B. C. Electric Railway Company at Vancouver holds a Red Tag sale to clear a line of merchandise which has been discontinued. Special terms are offered during the sale and the advertising includes newspaper space, direct mail, and window displays. The picture shown illustrates the 1931 window idea, with G. T. Clarke, supervisor of washing machine sales, as "Dad" at the scrubbing board going through the arduous motions of washing clothes before the advent of the electric washer. As a direct contrast, a trim housewife does her task easily and efficiently with a Minimax washer in the same window. This attracted record crowds on both three-day occasions when it was used, and sold the entire stock, 30 machines, of the discontinued line.

Dad's predicament makes dads buy

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Selling a Sales Plan

TO SELL and resell the 1931 co-operative dealer sales plan to the dealers themselves and also to announce the opening of a three months' range campaign, the Pacific Gas and Electric Company, on March 26, held a mass meeting of dealers, manufacturers' agents, distributors, and company salesmen in the company auditorium. To these the company presented a picture of the sales possibilities and the co-operative plans of the company by means of skits, some of which were prepared by the manufacturers and others by the company. Completely encircling the auditorium was a range and water-heater display by nearly every manufacturer of this equipment; the display was the largest ever held in San Francisco.

R. E. Fisher, vice-president in charges of sales, welcomed the guests, after which short announcements regarding the range campaign, reiterating the dealer sales plan and explaining the advertising program of the company and the possible dealer tie-in, were interspersed by the skits. One depicted an electric range "talking for itself" by means of a loudspeaker in the oven. Others showed the possibility of alert salesmanship as contrasted with some of the poorer types of contractor-dealer establishments. The meeting was closed by H. M. Crawford, commercial manager, who expressed the company's desire to co-operate fully with the numerous dealers who attended the meeting.

Edison and Dealers Launch Sales Test

CONTINUING its experiments in co-operative merchandising, the Southern California Edison Company, and dealers in the San Joaquin Valley territory served by the company, have initiated a program whereby it is hoped that the combined efforts of both will result in the effective promotion and sale of domestic electrical appliances.

Commenting upon this latest step, W. L. Frost, vice-president in charge of sales of the Edison company, stated: "The company is primarily interested in the sale of its commodity, electric energy, and, as a means of developing and expanding its business, is desirous that all apparatus economically using its product be aggressively sold to its consumers. In the interest of co-ordinated sales of all household electrical appliances it is the desire of the company to enlist the active co-operation and the friendly support of all dealers in its territory."

The new program is applicable in the Porterville, Tulare, and Visalia districts of the company in the southern portion of the San Joaquin Valley. Approximately 25 dealers will participate in the new co-operative merchandising undertaking.

As finally adopted, the program involves concessions both on the part of the Edison company and on the part of the dealers. As its part in the new co-operative undertaking the Southern California Edison Company will:

1. Withdraw its staff of commissioned merchandise sales specialists from the territory in which the program is operative.

2. Maintain one or more (depending upon the needs of the plan), salaried sales supervisors whose duties will be to contact dealers and co-ordinate all merchandise plans. These sales supervisors will assist in training dealer salesmen and will offer helpful sales suggestions. They will suggest to and assist dealers in any special sales campaign. They will assist in developing air-heating business and will write specifications on wiring layout for air-heating installations. They will handle for dealers prospects they may have for heavy-duty hotel and restaurant equipment. The supervisor's services will be available to all dealers participating in the plan.

3. Discontinue sale to the public of all electrical appliances excepting convenience outlet appliances and lamps. The company reserves the right to sell to its own employees for their personal use all types of appliances. In the matter of small appliances, the company intends only to maintain displays and will not put forth any special effort to make sales.

4. Permit dealers to use the floor space of its offices for display purposes.

5. Continue its present policy of promotional newspaper advertising and publicity. All advertising will be designed to stimulate sales. The company advertising will make proper mention of the co-operating dealers. The company hopes that dealers and manufacturers will also participate in the sales promotional activities with effective and adequate advertising.

6. Provide at its expense the services of a home economist, thoroughly trained and capable of demonstrating and instructing in the use of electrical ranges. The home economist's services will be available to any dealer.

7. Maintain its present servicing policy.

8. Assist in the promotion of Red Seal wiring plans as advocated by the Pacific Coast Electrical Bureau. The company's lighting and power specialists will co-operate actively with dealers in helping develop prospects for Red Seal wiring.

For their part, the dealers participating in the program will undertake the following:

1. Individually and collectively assume the responsibility for obtaining the following quotas:

Electric ranges	440
Electric water heaters	190
Electric refrigerators	250
Electric washing machines	115
Electric ironing machines	115
Electric air heating	625 hp.
Heavy-duty or commercial cooking and heating	160 hp.

2. Place in the field salesmen properly instructed and trained to sell ranges, water heaters, refrigerators, washers, ironers, and air-heating and heavy-duty hotel and restaurant equipment.

3 Promote aggressively Red Seal wiring in all new houses contacted and, following the wiring, promote the sale of electrical appliances.

4. Recognize the advisability of reasonable wiring installation costs.

5. Conduct a place of business, regularly exhibit a recognized standard line of heavy-duty appliances, such as ranges, water heaters, air heaters, refrigerators, and other appliances. Dealers also will have on display convenience outlet appliances inventorying at cost, approximately $250.

6. Promote the sale of electric ranges, water heaters, air heaters, and refrigerators in preference to appliances using some service other than electricity in their operation.

Detailed operation of the plan contemplates that a committee be maintained whose membership will consist of one dealer from each of the three districts involved, and two members appointed by the Edison company. The duties of this committee will be to supervise the harmonious operations of the plan.

Displays of refrigerators or ranges maintained by the dealers will be what manufacturers or jobbers consider an appropriate range of models, but in no case less than three. Only recognized standard lines of heavy-duty appliances will be handled by dealers engaging in the co-operative merchandising undertaking.

In commenting upon the plan further, Mr. Frost said: "The successful consummation of this arrangement depends entirely upon the sincerity of purpose of each of the parties. Both the company and the dealers have agreed to lend their whole-hearted and active co-operative effort to the end that the arrangement will eventually develop into a permanent operation mutually beneficial. Details of the plan are subject to change upon and after proper discussion between the company and the co-operating dealers. Should, by agreement, the plan be abandoned, it will be done without prejudice."

As in the case of the Long Beach co-operative merchandising and load-building plan of the Edison company, this new program is designed to facilitate and expedite load-building activities, and at the same time to see that the primary interests of both the company and the dealers are taken care of adequately.

Importance of Public Relations Is Emphasized at Arizona Convention

THREE hundred delegates representing public utilities in Arizona acted as one man in the role of host at the sixth annual convention of the Arizona Utilities Association held at the Arizona Biltmore, Phoenix, April 8-11. Officially represented at the convention were the National Electric Light Association, the American Gas Association, the Pacific Coast Electrical Association, the Pacific Coast Gas Association, and the Rocky Mountain Division of the N.E.L.A. Guests from Texas and New Mexico were present, and Western women of the industry were ably represented by Mrs. Nyra G. Letchworth, San Joaquin Light & Power Corporation, Fresno, Calif., chairman of the women's committee, P.C.E.A.

It is seldom that a convention of any kind obtains such unity of purpose as did that of the Arizona Utilities Association, and from the keynote speech of A. F. Morairty, assistant general manager, Central Arizona Light & Power Company, and president of the association, who spoke on "The Inverse Intangible Tax," to the address on "The Power Industry and Political Sabotage," by W. C. Mullendore, vice-president, Southern California Edison Company Ltd., Los Angeles, delivered in the third general session, the subject of public relations was emphasized from the point of view of the technician, the executive, the manufacturer, distributor, and mechanic. The same thought was stressed by public officials and representatives of the public and technical press who had place on the varied programs. Pertinent talks were made by R. J. Cordiner, Pacific Coast manager, Edison General Electric Appliance Company, San Francisco; R. E. Fisher, vice-president in charge of public relations and sales, Pacific Gas and Electric Company, San Francisco; G. B. Buck, commercial manager, Public Service Company of Colorado, Denver; George T. Bigelow, assistant general agent, Southern Sierras Power Company, Riverside, Calif.; Roy Richards, gas plant superintendent, Central Arizona Light & Power Company; Arthur Prager, president, Albuquerque (N. M.) Gas and Electric Company; and G. C. Tenney, editor of ELECTRICAL WEST, San Francisco.

Speakers from outside the electrical industry included W. V. DeCamp, general manager, United Verde Copper Company, Jerome, Ariz.; K. B. Peterson, attorney general of Arizona; and Wesley Knorpp, publisher, *Arizona Gazette*, Phoenix.

Addresses were made by H. L. Aller, representative of the American Gas Association, New York; A. B. Day, president and general manager, Los Angeles Gas and Electric Corporation, representing P.C.E.A.; and P. M. Downing, vice-president and general manager, Pacific Gas and Electric Company, who represented the N.E.L.A.

Claude Webber, superintendent of operation, Tucson Gas & Electric Company, who served as second vice-president last year, was elected president; C. T. Yates, assistant general manager, Arizona Edison Company, Phoenix, first vice-president; F. L. Benham, manager, Upper Verde Public Utilities, Jerome, second vice-president; and J. S. Arnold, Phoenix, executive secretary (re-elected). The directors include: Willis T. Johnson, general manager, Yuma Utilities Company, Yuma; George T. Herrington, general manager, Commercial Power & Light Company, Flagstaff; L. V. Seares, general manager, Arizona Power Company, Prescott; and A. F. Morairty, Phoenix.

Tucson was chosen as the place for the next annual convention.

A. F. Morairty, the retiring president, and Mrs. Morairty use the convention fresh-air taxi service to convey them to the Arizona Biltmore

Mr. Morairty, the retiring president, in his opening address stressed the danger to the utilities arising from the present political agitation against the so-called power trust and proposed as a remedy the improvement of personnel with the object of so informing members of utility organizations that their consequent relations with consumers will be greatly improved and they will be proud of the industry by which they are employed. Both Mr. Aller and Mr. Downing endorsed the retiring president's plan for meeting the political attack.

J. S. Arnold, executive secretary of the association and also sales promotion manager of the Central Arizona Light & Power Company, Phoenix, had charge of the program, and G. F. Maughmer was chairman of the entertainment committee. Entertainment features included a merchandising travesty, "Asleep in the Deep," golf on the Biltmore course in the interludes, musical numbers with dancing in the dining room in the evenings, a Wild West rodeo, a barbecue served at the Adobe Shack, and entertainment by a group of Hopi Indian dancers and "cow punchers."

Arizona state finals in the N.E.L.A. public speaking contest were conducted during the convention, first place being won by Cecil Stewart, of the Central Arizona Light & Power Company.

Edison Company Lowers Valley Power Rates

Voluntary reductions in agricultural power rates to consumers in the San Joaquin Valley will be put into effect by the Southern California Edison Company Ltd. during May, June, July, and August of this year. The new schedule, which makes a reduction of approximately 20 per cent in energy charges, has been adopted as an emergency relief measure to farmers who are facing a serious problem this summer owing to low water tables, necessitating increased use of electric power for pumping purposes.

The territory involved in the reduction includes all of Tulare County, and portions of Kern and Kings Counties. Approximately 5,000 agricultural power consumers will be benefited by the lowered rates to the extent of some $330,000.

There has been considerable agitation recently in favor of the formation of a municipal utilities district in Tulare. It is understood that the voluntary rate reduction of the Edison company will go far toward quieting this agitation, the backers of the district having agreed to suspend activities in behalf of its formation "pending the working out of a permanent rate structure."

California Utilities Must Reduce Rates in Agricultural District

EFFECTIVE May 1, interim reductions in the electric rates of the San Joaquin Light & Power Corporation, Fresno, Calif., and the Midland Counties Public Service Corporation, San Luis Obispo, of approximately $600,000, figured on an annual basis, have been ordered by the California Railroad Commission, which on April 8 unanimously approved and released an opinion and order submitted by Commissioners Carr and Harris, before whom the hearings were held. Of this amount, $450,000 goes to agricultural power users in the form of a 20 per cent discount on the energy portion of their power bills during May, June, July, and August, and the balance of $150,000 to lighting consumers within incorporated cities and to general power users. The proceeding was initiated on complaint of the California Farm Bureau Federation and other bodies, and the commission instituted on its own motion an investigation into the rates and practices of the two utilities.

From a study of the revenues and expenses of the two companies, Claude C. Brown of the Railroad Commission's staff, had adduced that the companies were making 1 per cent in excess of a just profit on a rate basis of $63,800,000, or approximately $638,000 in excess profits. The power companies denied this charge, contending that Mr. Brown had not carried his figures far enough. They argued that the last several years have yielded a profit solely on account of the fact that they were dry years in which the agricultural pumping load was increased and that the commission should adjust the actual figures for revenues to those figures which would have prevailed had the rainfall been up to normal. L. J. Moore, executive engineer of the San Joaquin company, contended that precipitation should be considered only in reaching an adjustment for a normal year and that the normal year only should be considered in fixing a rate. A chart showing monthly kilowatt-hour sales over the past four years, and the general trend, was introduced by the power companies to show that, because of variations in the seasonal agricultural load, their plants must be enlarged to a summer capacity, while during the winter months when there is a small agricultural load the greater portion of this capacity is not used. The companies held that this fluctuation in agricultural power load directly results in higher operating costs, as they must be prepared at all times to satisfy the peak demand.

On the other hand, the lack of rainfall was made the basis of the plea for a reduction in power rates by the irrigation districts in the territories served by the two power companies, witnesses testifying to an increase in installation of pumping plants in the districts, with a consequent increase in power costs.

Consumer groups at the hearing advanced sharply conflicting claims as to the spread of any reduction which might be made. Discussing this conflict the commission said: "The most difficult question here presented centers about the spread of rates. It is enough to say that after the most careful consideration of the record, including evidence as to the ability of agricultural power consumers to pay and the value to them of the service, the effect on the utilities of sustaining the agricultural power load, as well as the history of the rate changes of these two utilities and a comparison of their rates with those of other major utilities, the conclusion has been reached that bills rendered for agricultural power on meter readings made on and after May 1, 1931, should be discounted for a period of four months only as to the energy portion thereof, and that lighting, heating and cooking rates within incorporated cities and general power rates should be reduced."

The opinion reviews at length the interim or emergency increases in rates given the utilities during the war and post-war period and concludes that similar relief should be granted with equal promtness to consumers in view of their present distressed condition. With the interim rates the companies, it was pointed out, would still be in a satisfactory earning position. "The reduction ordered," the opinion ran, "is one to which the companies should have no just or legal ground of complaint and, while perhaps representing the maximum which the commission is justified in ordering under the record here made, might well, as a matter of company policy, be increased in view of the distressed conditions of the companies' territory and consumers, for the utilities may, of course, do voluntarily that which the commission may not order them to do."

Under the schedules ordered, the bulk of the reduction to lighting consumers will go to consumers with bills of from 50 cents to $10, there being about a 7¼ per cent reduction in energy charges for the first 200 kw.-hr. per meter per month. The interim rates are to be in effect only until permanent rates are set. Hearings of the case for the setting of permanent new rates were ordered placed on the calendar for May 26 in Fresno, at 10 a.m. The companies are expected to be ready to give full evidence in such a case by Oct. 1.

The present order directing interim reduction in rates is the third order of this character made by the commission. The first was given in 1922, when Southern California Edison Company's rates were ordered down, and the second was made last year, when Pacific Gas and Electric Company's rates were reduced by over $2,000,000 a year, awaiting final determination of pending proceedings.

A request by the companies for a rehearing has been denied by the Railroad Commission.

To Carry Power to Dam Site

THIS structure in the desert is a special type of tower in use only on the Hoover Dam 230-mile transmission line, now under construction by The Southern Sierras Power Company, Riverside, Calif.

Bases are first completely assembled and set in the earth. On the base sections the vertical members are erected, and the diagonal bracing is then added as the men ascend the poles. The upper section is built up in a similar manner, and then the arm members are hoisted into place and bolted. Approximately 500 bolts are required for the complete assembly of one of these towers. The line, which will carry power from San Bernardino, Calif., to the site of Hoover Dam for construction purposes, will be 230 miles long and is expected to be ready for operation by June 1 instead of June 25, the date set by the United States Department of Interior.

CALIFORNIA BILL KILLED IN COMMITTEE—Senate Bill 275, known as the Inman Bill (see ELECTRICAL WEST, March 1, 1931, p. 153), a measure designed to prohibit California utilities from merchandising, has been killed in committee.

PUBLIC UTILITY TAX PLAN DEFEATED—A constitutional amendment to tax publicly owned utilities, introduced last month in the California Assembly, met overwhelming defeat. The proposal required a two-thirds vote for adoption and more than two-thirds of the Assembly went on record against it.

Three California Utilities Reduce Electric Rates

Voluntary rate reductions placed in effect last month will result in savings to the consumers of three electric utilities operating in California. Coast Counties Gas & Electric Company placed in effect on April 15 a revision and reduction of its agricultural power rates, saving consumers $25,000 a year.

Revisions and reductions in its electric schedules covering lighting, heating and cooking were made effective April 15 on the system of The Southern Sierras Power Company. Similar reductions apply to the company's agricultural power service as of May 1. Savings to consumers will amount to $42,875 a year.

California Oregon Power Company revised its agricultural power rates on April 15 for territory served in the vicinity of the Oregon border, resulting in a saving of $1,000 a year to consumers.

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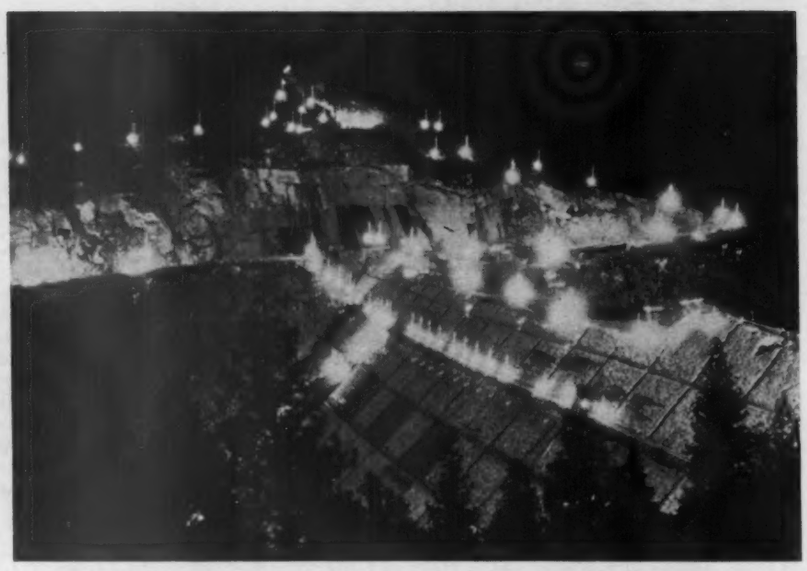
San Joaquin Valley Ranchers Bring Suit

Damage suits involving riparian rights of land owners in the San Joaquin Valley (Calif.) are on file against the Southern California Edison Company Ltd., the San Joaquin Light & Power Corporation, and various irrigation companies making use of the waters of the San Joaquin River.

Named as defendants in a suit filed in the superior court of Modesto, Calif., by 41 ranchers of western Stanislaus County, who seek a total of $2,522,814 for alleged damages to their properties are: Southern California Edison Company Ltd., Miller and Lux, Inc., San Joaquin Light & Power Corporation, San Joaquin and Kings River Canal and Irrigation Company, Gravelly Ford Canal Company, Chowchilla Farms, Inc., Firebaugh Canal Company, San Luis Canal Company, and Santa Rita Irrigation Company.

The plaintiffs claim that the erection of storage dams and canals by the defendant companies has greatly reduced the stream flow of the San Joaquin, making adequate irrigation of the farm lands impossible. The complaint also sets forth that the riparian rights of the plaintiffs have been violated and an injunction to restrain further storage of water is sought, in addition to the damages asked. For alleged damages suffered to date the plaintiffs ask $1,006,953, and a total judgment of $2,522,814 if the impounding of water is not stopped immediately. The complaint charges that the companies named have been diverting water from the river within the last five years, to the extensive impairment of the agricultural productivity of the plaintiffs. Seeking an injunction to prevent the Southern California Edison Company Ltd. from constructing dams and reservoirs and storing water in the mountains east of the lower San Joaquin Valley, Central California Mortgage Company and John C. Kincanon, owners of land in San Joaquin County, have filed separate suits against the power company in Stockton, Calif. The Mortgage company is the owner of 400 acres of land, and Mr. Kincanon is the owner of 693 acres. Both plaintiffs contend that large acreages are fertilized by silt deposits and that the full flow of the river is required. In the event the injunction is denied, the Central California Mortgage Company asks $125,000 damages and Mr. Kincanon asks $150,000.

Looks Like Christmas at Night



Salt Springs Dam, being constructed by the Pacific Gas and Electric Company on the Mokelumne River in California, takes on a festive air after dark. This illumination for night work is helping to maintain a schedule which calls for completion of the dam by June of this year

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Rates Are Reduced on San Diego System

Reductions in various electric rate schedules of the San Diego Consolidated Gas & Electric Company, San Diego, Calif., which became effective April 1 will total $160,100 annually, according to W. F. Raber, vice-president and general manager.

An annual saving of $26,200 will apply to domestic electric customers who use over the minimum of 12 kw.-hr. The second block of the former D-1 rate schedule which provides for 38 kw.-hr. at 6 cents net has been reduced to 5.75 cents. Commercial lighting customers will benefit substantially, and the reductions also apply to ornamental street lighting, other miscellaneous lighting, and heating schedules. Commercial and mercantile establishments will be benefited to the extent of $94,000 annually. Under the new schedule the commercial customer is entitled to a net rate of 4 cents per kw.-hr. after he has used 350 kw.-hr. Heretofore the schedule called for 800 kw.-hr. per meter per month before the customer automatically received the advantage of a 4-cent rate.

The reduction in agricultural power rates will amount to $10,000 annually. This cut applies to users of power for general agricultural and reclamation service, including pumping, feed choppers, milking machines, heating for incubators, brooders, poultry house lighting, and general farm use, but excludes cooking and general lighting service.

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Ordinance Proposes Puget Sound System Purchase

The Seattle city council now has before it an ordinance to place before the voters at the next March election, the question of taking over the entire distribution system of the Puget Sound Power & Light Company within Seattle's borders, and two of its hydro-electric plants in King and Pierce Counties. The ordinance is sponsored by Councilman Frank J. Laube, George W. Hill and John E. Carroll, who state that it has been decided to bring the condemnation question to a public issue now, in order that the people may be fully informed on all angles of the subject in time to vote intelligently on the proposal next year.

The two power plants, at White River and Snoqualmie Falls, are included in the program in order to avoid huge severance charges which the company might claim as the result of separation of these power houses from the city distribution system which they feed.

Estimates of the cost of such a purchase have been placed between $50,000,000 and $70,000,000.

New Operating Set-up Announced By Puget Sound Co. President

PRESAGING a field reorganization of the Puget Sound Power & Light Company, J. F. McLaughlin, newly appointed president, announces that the operation of the company will be carried on by three major divisions and that three officers of Eastern subsidiaries of Stone & Webster will shortly come West to head these divisions. These executives are J. F. Alexander, formerly president of the Houston Electric Company and Galveston-Houston Electric Railway Company; Claude C. Curtis, vice-president and manager of the Fall River Gas Works Company, Fall River, Mass.; and W. M. Bird, president of the Cape Breton Electric Company, Nova Scotia.

Mr. Alexander, as division manager in the central district will have charge of operations in Seattle and the major part of King County. Mr. Curtis, as division manager, will supervise operations in the southern district, including the city of Chehalis, and Cowlitz, Lewis, and Grays Harbor Counties; the southwestern district, including the city of Tacoma, and Pierce and Thurston Counties; and the western district, including the city of Bremerton, and Clallam, Jefferson, and Mason Counties. Mr. Bird's territory, as division manager, will include the northern district, including the city of Bellingham, and Whatcom, Skagit, and Island Counties; the northeastern district, including the city of Everett and Snohomish County; and the eastern district, including the city of Wenatchee, and Chelan, Kittitas, and Douglas Counties.

L. R. Coffin, formerly manager of the central district, has been appointed vice-president in charge of operations of the Puget Sound company.

PUGET SOUND Company's new president prepares for contest with his fellow officials by buying himself a new pair of golf shoes soon after his arrival in Seattle. Left to right: J. F. McLaughlin, president, E. W. Brownell, comptroller, and W. H. McGrath, vice-president, Puget Sound Power & Light Company; W. W. Wood, executive vice-president, Engineers Public Service Company, holding company for the Puget Sound company, and Samul P. MacFadden, vice-president of the latter company

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Seattle Settles Claim of Diablo Dam Contractors

The Seattle Board of Public Works has recommended to the city council that Winston Brothers Company, of that city, be allowed $303,005.32 as extra compensation for building the Diablo Dam of the City Light Department on the Skagit River. This settlement of the contractors' claim for $608,969.65 for work not covered by the contract would bring the total cost of the dam to $4,877,500, of which Winston Brothers would receive $3,977,500, the balance representing cost of machinery, engineering expenses, and various other extras.

The proposed compromise provides that the city shall withdraw its counter claim for $419,600 against the contractors for failure to complete the work within the specified time.

Additional excavation and much heavier construction on the dam than was provided in the original estimate caused the huge bill for extras. City engineer R. H. Thomson explains that much of this additional work was demanded by federal engineers upon failure of the St. Francis Dam in California.

San Francisco Charter Creates Utilities Body

A public utilities commission of five members appointed by the mayor for four-year terms, but subject to recall by the voters, is created by a new charter adopted by San Francisco at a special election held March 26. The charter has been ratified by the State Legislature and will become effective Jan. 8, 1932.

Declaring that it is the intention of the people to acquire public utilities gradually, the new charter gives the public utilities commission the management, control, and operation of the municipal railway, San Francisco water department, Hetch Hetchy construction, airports, and other public utilities which the city may acquire. Under the old charter, responsibility for the management and the operation of city-owned utilities was divided between the Board of Public Works and the Board of Supervisors.

Under provision of the charter, a vote of the people must be taken before any of the utilities can be sold or leased. The commission is given the authority to revise rates and fares, but the supervisors may reject any schedule submitted by the commission.

The commissioners are given salaries of $100 a month. They are empowered to appoint a manager of utilities at a salary of $12,000 a year, who, in turn, is authorized to appoint and remove, subject to the approval of the commission, the head of each utility under the commission's jurisdiction.

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L. A. Power Department Employees Reinstated

The Los Angeles Board of Water and Power Commissioners on April 14 abolished the business agent's division as a separate organization of the Department of Water and Power and ordered restored to duty C. O. West, T. H. Mullen, and James F. Moran, who, with Burdette Moody, head of the business agent's division, were dismissed on a charge of destroying department records. Mr. Moody thus was not reinstated.

The four men, dismissed from service in the department last January, were given a hearing before the city civil service commission and all were exonerated with the recommendation of the civil service commission that they be reinstated. Mr. West is an executive assistant, Mr. Mullen a junior electrical engineer, and Mr. Moran a construction foreman.

The resolution of the water and power commission discontinuing the business agent's division provides for consolidation of the division with the commercial division. The consolidation, the resolution held, will result in substantial savings to the department through increased efficiency and economy of operation.

Seattle City Light Under Public Works Board

Latest development in the controversy resulting from the dismissal of J. D. Ross, superintendent of Seattle City Light, by Mayor Frank Edwards, is the taking over of the Light Department management by the Board of Public Works, and the placing of George W. Roberge, secretary of the board, in charge as temporary superintendent. Meanwhile, the mayor's effort to name a successor to Mr. Ross has three times been rebuffed by the city council.

Five thousand copies of a petition for the recall of Mayor Edwards have been circulated in Seattle, charging the mayor with dismissing Mr. Ross upon reasons "known to be false and unfounded." There are seven charges in all in the petition, naming various acts of malfeasance in office and dereliction in his mayoralty duties.

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All Consumers Benefit By Arizona Rate Cut

Effective May 1, new rates applicable to practically all classifications of consumers, and resulting in an annual reduction of more than $128,000, have been announced by the Central Arizona Light & Power Company, with the approval of the Arizona Corporation Commission. The rates will affect consumers in Phoenix and several other towns in the Salt River Valley, Arizona. These rates will not necessarily cause reductions for every consumer under existing conditions, since the form of rate is different from that of the old rates, and for this reason the existing rates are to be retained as optional rates which may be elected by the consumer.

The prominent feature of the new rates is the introduction of a flat charge in addition to an energy charge which, in the new rates, does not exceed 5 cents per kw.-hr.

Under the new schedule the Phoenix residential rate calls for 75 cents per month flat charge, plus 5 cents per kw.-hr. for the first 70 kw.-hr., and 4 cents per kw.-hr. for all energy used in excess of that amount. Under the optional old rate the monthly minimum charge was $1; 8 cents per kw.-hr. for the first 20 kw.-hr.; 6 cents per kw.-hr. for the next 30; 5 cents per kw.-hr. for the next 50; and 4 cents per kw.-hr. for energy in excess of that amount.

The new commercial rate specifies 60 cents per month per 500-watt demand; 5 cents per kw.-hr. for first 70 kw.-hr. per 500-watt demand; 4 cents per kw.-hr. for next 500 kw.-hr.; 3 cents per kw.-hr. for next 1,000 kw.-hr.; and 2 cents per kw.-hr. for all in excess.

The optional former commercial rate specified $1.20 minimum per kilowatt demand; 8 cents per kw.-hr. for the first 75 kw.-hr. per kilowatt of demand; 6 cents per kw.-hr. for the next 250 kw.-hr.; 4 cents per kw.-hr. for next 500 kw.-hr.; 3 cents per kw.-hr. for the next 5,000 kw.-hr.; and 2 cents per kw.-hr. for all in excess.

Power rates show a reduction in the initial rate which is 5 cents per kw.-hr. instead of 6 cents as heretofore.

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"Power District" Meeting Held in Spokane County

A movement to form a power district or districts under the recently enacted District Power Bill was formally launched in Spokane at a meeting held April 4. About 200 residents from all parts of Spokane County attended the meeting "to see what can be done toward formation of power districts, building distribution lines, and if necessary generate hydro-electric power." The consensus was that action should be taken without delay to the end that power district propositions be placed on the 1932 general election ballot. Those in attendance also voted to demand a hearing on the rates now being charged for light and power by The Washington Water Power Company. Speakers declared that these rates were 50 per cent too high.

Following the meeting a committee of one representative from each community, authorized at the meeting, met and elected J. W. Haney master of the Spokane County Pomona G[illegible]nge, of Orchard Prairie, chairman, and H. J. Cheek, secretary of the County Grange Council, secretary.

COLORADO VOTERS OPPOSE MUNICIPAL PLANT—Advocates of a municipally owned electric light and power plant at Grand Junction, Colo., met overwhelming defeat April 7 when the proposal lost by a vote of 2,387 against, with only 959 for. Grand Junction is western Colorado headquarters for Public Service Company of Colorado which maintains an annual payroll of $140,000 at that point. A $750,000 bond issue was voted on to finance erection of a municipal plant to supersede the private utility's $2,000,000 investment. Defeat of the measure also safeguards the Redlands Irrigation district, near Grand Junction, in its plans to build a power plant and sell excess energy to Public Service Company, thus providing funds for retirement of construction indebtedness.

PERSONNEL CHANGES IN B C. COMPANY—A. T. Goward, vice-president of the B. C. Electric Railway Company's Vancouver Island branch, recently announced the following changes in the merchandising division of the Victoria branch of his company: S. J. Halls is now manager of the ligh and power department in Victoria; F. McKitrick has been transferred from the position of head salesman to merchandising superintendent; H. P. Sabiston, formerly on the sales staff, is now store manager, and W. B. Wellwood, formerly clerk, will in future occupy the position of merchandise storekeeper.

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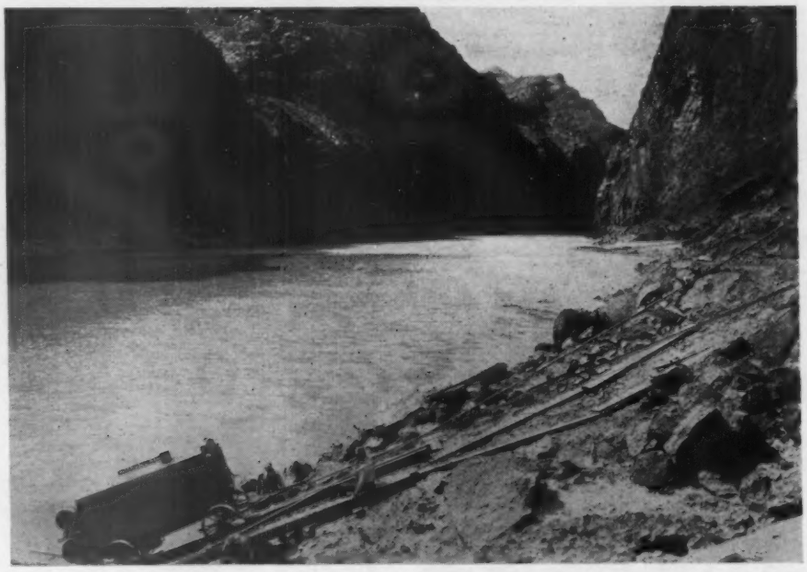
Railroad Descending Slope to Hoover Dam Site



THE third railroad connected with the construction of Hoover Dam has been started by Six Companies, Inc., who have the government contract, signed at Las Vegas, Nev., on April 11. This double-track road will enable the "Big Six" to get their equipment to the dam site in the canyon and haul in supplies and return with refuse from the diversion tunnels.

Ingersoll-Rand Company has the contract for supplying all air compressor and rock drilling equipment used on the project. One of their portable compressors is shown being hauled by block and tackle up the steep incline after being floated down the river by barge.

License Granted for Alaska Project

(Washington Correspondence)

The way has now been made clear for the development of a power project on the Davis River, Alaska, by the granting last month of a Federal Power Commission license to the Portland Canal Power Company, of Seattle. The project will be located entirely on public land within the Tongass National Forest, but the dam, power house, and a portion of the reservoir will be on unpatented mining and mill site entries made by the applicant company, which had its preliminary permit issued to it on Oct. 5, 1929, for a period of two years.

After conference with the Federal Power Commission, Willis T. Batcheller, consulting engineer for the Portland Canal Company, revised the original plans for the development (ELECTRICAL WEST, Feb. 1, 1931, p. 98). A variable-radius arch dam, with an initial installation to El. 400 ft., is now specified. This dam will provide 34,000 acre-ft. storage, 240 sec.-ft. dependable flow, and 6,900 hp. nominal power capacity, and the initial installation will have a capacity of 17,000 hp.

It is proposed to sell the power to mines and public utilities in the watersheds of Salmon and Bear Rivers on both sides of the international boundary. The only towns in the vicinity are Hyder, Alaska, and Stewart, B. C., each having a population of 250 to 300 and each served at present by a small hydro-electric plant. Beyond these towns and extending over a considerable area on both sides of the boundry is a gold and silver-lead mining district. It is estimated by the Portland Canal company that under existing conditions of mining development and load 5,700 hp. can be sold at an average of $60 per horsepower a year, and that in one to five years, respectively, after the beginning of operation, the load will have grown to 10,800 and 19,000 hp.

After proper audit, the commission allowed $144,765.45 as the actual original legitimate cost of the project as of Dec. 31, 1930.

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COPCO MOVES KLAMATH PROJECT TO CALIFORNIA—One of the first definitely unfavorable results of recent legislation in the state of Oregon is indicated in the action of The California Oregon Power Company, Medford, in filing application with the Federal Power Commission for a preliminary permit for a hydro-electric development on the Klamath River a short distance over the state line in California. The company had originally planned this development on the same river in Oregon near Keno and held a preliminary permit for such development. Difficulties encountered in securing a proper title to this site from the State of Oregon caused the company to abandon its original plan and undertake the development in California.

P. C. E. A.

Convention Chairmen Busy On Del Monte Plans

Between June 23 and 27, the Pacific Coast Electrical Association will hold its fifteenth annual convention at Del Monte, Calif. Al C. Joy is general chairman of this year's program. With him and President A. M. Frost have been working Committee Chairmen W. R. Marshall, hotels; W. P. Bear, lighting; Ray Alvord, railroad transportation; Willis Winter, registration; Ed. Wood, motor transportation; Frank Boyd, banquet; Frank Bevan, show; Dave Harris, entertainment; Al Nicoll, sports; Harry Garbutt, ladies' entertainment; Harry Thomas, program; and George Tenney, publicity.

Tuesday, June 23, the opening day of the convention, will be given over to registration; general sessions begin on Wednesday morning, and parallel sessions of all sections are scheduled for Wednesday afternoon. Presentation of dramatized reports of each session will occupy Thursday, a public relations general session will be held Friday morning, and business will be closed with a short Saturday morning session.

Entertainment officially begins Wednesday night with an outdoor pageant of Venetian motif. A minstrel show and ball are programmed for Thursday night, and the golf tourney is a Friday afternoon feature. The convention banquet is on Friday night.

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State Semi-Finals Held In Speaking Contest

First step toward winning a part of the National Electric Light Association's $3,500 for prize winning speeches was taken last month by men and women contestants in state elimination contests.

George Carrothers, of the Coast Counties Gas & Electric Company, Santa Cruz, won first place for men in the northern California semi-finals held April 24 in San Francisco, and Mrs. Lillian Broeker, of the Pacific Gas and Electric Company, San Francisco, was the winner in the women's contest.

At the southern California semi-finals held on the same day in Los Angeles, James Donohue, of the Southern California Edison Company Ltd., took first place in the contest for men, and Mrs. Elizabeth Lawton, of the Los Angeles Gas and Electric Corporation, won among the women.

Finals for the Pacific Coast Division will be held in Fresno, Calif., on May 8. Representatives of Nevada companies failed to compete in the contest this year. Cecil Stewart, of the Central Arizona Light & Power Company, Phoenix, winner in the Arizona contest, will meet California winners at the Fresno finals.

Commercial Section Winds Up Activity

Final, in that it closed the year's committee activity with the submittal of the year's papers, the third conclave of the Commercial Section, P.C.E.A., was held at Fresno, Calif., April 9-10, 1931.

Beside the final reports of the bureaus and committees, whose work will be reported in detail in the published papers to appear in the May 15 issue of ELECTRICAL WEST, the meetings were featured by several talks of interest. Among these were a report of the Commercial National Section meeting in Chicago by Commercial Section Chairman E. G. Stahl, who attended that meeting, and a report of the Northwest Electric Light & Power Association Commercial Section conclave at Spokane, by Victor Hartley, who attended there.

In asking the continued support of the members for his administration next year, Frank Weiss, vice-chairman of the section, pointed out the greater need for commercial study and development work brought about by business conditions and the keenness of competition for the consumer's dollar. He announced a new committee, one on air conditioning, for next year.

Other speakers were A. M. Frost, P.C.E.A. president, who complimented the section on its practical contributions to selling the services of the industry; Dr. E. A. White, director of the National Committee on the Relation of Electricity to Agriculture, who made some startling prophesies as to the future of agriculture (see C.R. E.A. report, this issue); J. C. Faulkner, Fresno real estate man, who gave a stimulating and highly amusing talk on the "depression" and former depressions, and made classic the recurring term, "and the farmers lost their lands and moved away"; W. A. Cyr, who spoke on "This Now Wiring," which will be printed as a report of the wiring sales committee; Leo Gianini, who presented colored talking moving pictures depicting the value of sunlamps; and as a presentation of the Advertising-Publicity Section, D. L. Scott, manager of public relations, Los Angeles Gas and Electric Corporation, gave a very sage and dry, and consequently amusing and yet sagnificant talk, on "It's Psychological," meaning the talk but not the depression, which he said constituted a real challenge to American business men to prove the superiority of the American economic order.

Another feature of the conclave was a luncheon meeting of the Pacific Coast Electrical Bureau, central region, at which Chairman H. H. Courtright and R. M. Alvord, organization planner of the bureau, described the plan and operation of the organization.

The Advertising-Publicity Section held its regular quarterly meeting at the same time, discussing advertising methods and problems and its two presentations planned for the convention.

Northwest Association

This Year's General Convention Canceled

As an economy measure for the electrical industry in the Northwest territory, the Northwest Electric Light & Power Association has decided to cancel its plans for holding its general convention this year. The convention had been scheduled to be held at Boise, Idaho, June 17-20, 1931. Decision to call off this convention was reached by the executive committee, meeting in Portland on April 10.

The usual annual executive session, however, for the election of officers and the transaction of similar business, will be held at a time and place yet to be determined. At the same time the Public Relations Section will hold the finals of the public speaking contest and otherwise clear its year's work. Successful and enthusiastic section meetings have been recently completed by the Commercial, Engineering, and Accounting Sections.

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ACCOUNTING SECTION REPORT NEXT MONTH—Space prohibits the publication in this issue of ELECTRICAL WEST of a report of the seventh annual meeting of the Accounting Section of the Northwest Electric Light and Power Association at Salt Lake City April 13-14. A full report of the committee discussions at the three half-day sessions will therefore appear in the June 1 issue.

PUBLIC SPEAKING CONTEST WINNERS—Miss Dorothea Towne, Spokane, and Gordon C. Lynch, Colfax, won the women's and men's public speaking contests for employees of The Washington Water Power Company, conducted April 16-17. Miss Towne and Mr. Lynch will compete in the finals of the Northwest association contest.

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Engineering Section Reports Summarized

A summary of the reports presented and discussed at the eighth annual general meeting of the Engineering Section, Northwest Electric Light and Power Association, at Wenatchee, Wash., March 18-20, 1931, follows:

Accident Prevention Committee

J. B. FISKEN

The Washington Water Power Company, Chairman

The hazard contained in the moving of hay derricks under power lines, which has long existed in this territory, was described by E. C. Kiersted, Idaho Power Company. In his paper he presented the context of a pamphlet for distribution to derrick movers, instructing them of the danger, showing how it could be avoided, and offering the co-operation of the power company free. The use of this pamphlet supplemented by the attachment to all derricks of a metal sign carrying a similar caution had served to reduce the number of accidents caused by these implements.

In an endeavor to determine in what class of work accidents are occurring and where accident prevention work should be concentrated, Wallace Brier, Puget Sound Power & Light Company, had gathered statistics on the number of accidents and days lost from five companies divided according to classification of labor. A reduction of these statistics to frequency rate and severity rate indicated an improvement in accident experience for 1930 as against 1929.

A description of mechanical devices for artificial respiration, their uses and limitations was the subject of a paper by Walter Smith, Mountain States Power Company. The paper pointed out the danger lurking in the improper use of mechanical devices and stated the best all-around method was the Schaeffer Prone Pressure method of resuscitation. Several cases of fatal results following the interference of physicians desiring to substitute mechanical for natural methods of artificial respiration were cited. The special application of the inhalator in connection with the Shaeffer method in poisoning cases was described by H. H. Sanderson, The Sanderson Safety Supply Company, Seattle.

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Code Committee

S. B. CLARK

Northwestern Electric Company, Chairman

The standardization of the regulations of utility companies covering the service entrance and metering requirements in dwellings and the standardization of wiring types for such occupancies, was suggested as a means of reducing the cost of wiring while still providing adequacy, in a paper by F. D. Weber, Oregon Insurance Rating Bureau, and L. W. Going, chief electrical inspector, both of Portland, and presented by Mr. Weber. Four suggestions for standardization of wiring types taking adequacy into account, were as follows: (1) That a raceway type of wiring be installed to an outlet in each principal room; (2) that in small buildings a raceway be installed to the basement or to the attic; (3) that the rest of the house wiring should be one of only a few types; (4) that future capacity in service equipment and panelboards be provided.

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Electrical Apparatus Committee

J. HELLENTHAL

Puget Sound Power & Light Company, Chairman

In the report on metal clad switchgear, J. C. Henkle, Portland General Electric Company, pointed to the following economies to be found in the use of this type of equipment: (1) Although the first cost is greater, there is less maintenance; (2) there is great economy in the space required; (3) smaller equipment is easily replaced with that of larger capacity; (4) the fire and life hazard is less.

Closely allied to the preceding paper was the analysis of substation costs by A. Shipek, Puget Sound Power & Light Company, wherein he compared the cost of five designs of substations—three indoor and two outdoor—using masonry structure or metal enclosed equipment. Average conditions were imposed for the purpose of the study, building the stations for 3,000 kva. and later increasing the capacity to 12,000 kva. Curves were then drawn for each type of station to show how the cost per kva. would run. A viewpoint of the manufacturers was expressed to the effect that metal clad gear is now demanded in too many different types, sizes and kinds, and if it could be standardized, this general type of equipment could be greatly reduced in cost.

A summary of the results of recent developments in high-speed relays and quick response excitation by R. McKay and C. E. Cannon, The Washington Water Power Company, pointed out the characteristics and limitations of the equipment. It was shown that the development of this equipment had come about after stability became an important factor in system design, and the growing importance of stability on the power systems in the Northwest was stressed. In discussion the relative value of high-speed relay circuit breakers and the changing of the excitation was the principal subject.

E. A. Woodhead, Idaho Power Company, had conducted a survey to find to what extent special transformers were used with 2.3-kv. regulators on 11-kv. or 15-kv. systems in the Northwest. Four out of ten companies used such transformers but there appeared to be no definite trend toward their adoption generally. Only one company reported using single bushing type transformers for rural substations. The principal reason for not using them was on account of their interference with communication systems.

Methods of securing load ratio and phase control of transformers were described by D. R. McClung, Pacific Power & Light Company. Stating that there was only one installation where load ratio control is used in the Northwest, he pointed out that a large field existed for this apparatus, particularly at points of interconnection where saving in station capacity might be effected by control of wattless power, and at industrial substations for feeder regulation. The use of automatic load responsive switching in the Northwest was also canvassed and it was found that only three substations made any considerable use of this equipment.

A study of the available data on transmission line surges, their cause, magnitude, and methods of protecting against them was presented in a paper by T. D. Butts, Mountain States Power Company.

A recommendation against the operation of rotating machines by total temperature was contained in the report of D. L. Brundige, Utah Power & Light Company.

A description of the high-voltage bushing potential device and its characteristics and application was presented by F. M. Lewis, Northwestern Electric Company. The relative cheapness of this device as against the ordinary potential transformer, particularly in the higher voltages, commends this device for use to fill a number of needs now being filled by potential transformers.

A survey of grounding practices in the Northwest by A. H. Beckwith, The Washington Water Power Company, indicated that there was no uniformity of practice but that there was a trend toward the use of the bi-metallic ground rod.

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Hydraulic Power Committee

E. H. COLLINS

The Washington Water Power Company, Chairman

A year's progress in the development of fishways and experiment with the electric fish screen was portrayed in the report of the fishway subcommittee by J. E. Yates, Pacific Power & Light Company. Plans for taking care of the anadromous fishes at the Ariel development on the Lewis River and the Rock Island development on the Columbia River and at the North River project of Sanderson & Porter near Willapa Bay, Wash., were outlined. A new departure to take care of downstream migrants has been planned at the North River development where, during a part of the year, no water will be spilled over the dam. A vertical standpipe with pipe connections to the reservoir above the dam and to the water in the tailrace is designed to bring the fry downstream without allowing them to pass through the waterwheels..

A paper by W. D. Shannon, superintendent, Stone & Webster Engineering Corporation, on the Rock Island project, read in his absence by L. R. Coffin, Puget Sound Power & Light Company, Seattle, described the nature of the Rock Island development on the Columbia River.

Progress in the study of tree rings leading to the tentative conclusion that climatic cycles occur about every 94 years and that at the present time we are nearing the end of a dry spell was reported by Lyman Griswold, consulting engineer, Northwestern Electric Company. This research had been undertaken in connection with studies of the Lewis River watershed. A hydrograph of the relative width of the rings in thirteen trees cut from this area was plotted, giving an indication of relative precipitation since 1585. This curve showed valleys in precipitation in the years 1660, 1754, 1848 and (projected) 1942. A comparison with the actual rainfall records of Portland and Astoria for the last 80 years of this period showed a distinct similarity in characteristics. Mr. Griswold made it plain that these data were not conclusive, but he felt that further research would form the basis of accurate enough data on which to base general conclusions as to future precipitation and general climatic cycles. Discussion brought out the importance of such studies in planning hydroelectric developments.

Improved operating efficiency and frequency regulation and the solution of the problem of maintaining large reserve capacity economically through the installation of an "automatic operator" at the Long Lake station of The Washington Water Power Company, were described by J. S. McNair of that company. This equipment consists of four controls: (1) Station frequency control with automatic transfer between load and condenser operations; (2) base load control with automatic transfer; (3) station frequency control; (4) station base load control. The nature of

the equipment and how it operates was further elaborated by S. Logan Kerr, representative of I. P. Morris & De LaVergne, Inc., Philadelphia, the company which designed and furnished the equipment.

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Inductive Co-ordination Committee

H. H. SCHOOLFIELD

Pacific Power & Light Company, Chairman

A symposium on inductive co-ordination between communication and power systems that had occurred in recent years, with a description of the nature of the trouble and the manner in which it had been eliminated, was presented by the chairman. This symposium revealed that no problems had developed that were not susceptible of correction when approached in a spirit of co-operation. C. G. Duffin, Pacific Telephone & Telegraph Company, Seattle, referred to some of the cases in the report, adding information on the methods used in removing the trouble.

Reviewing the results of the research on radio interference from high-voltage pin and pedestal type insulators at Oregon State College, in which it was found that appreciable interference developed coincidentally with the formation of corona, Prof. F. O. McMillan presented the second progress report on this research. It was shown that the ultimate solution would lie in a change in design of the insulators in addition to the application of a coating to distribute the dielectric flux.

Collaborating in the report with Professor McMillan, Ellis Van Atta, Pacific Power & Light Company, described tests made on lines in service in his company on which some of the newer designs of interference-proof insulators had been installed. These tests indicated that the noise level at operating voltage had been decreased.

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Meter Committee

A. H. KREUL

Portland General Electric Company, Chairman

Reports of subcommittees on different phases of meter work indicated the general lack among member companies of a comprehensive method of training meter men; that a meter accuracy report with uniform percentage grouping should be adopted by member companies; that the accident record among meter men in 1930 was improved as against 1929; that accidents seemed to be caused by mechanical forces rather than electrical ones; and that in the light of incomplete tests on the wearing qualities and costs of natural jewels as against synthetic jewels, simplicity, convenience and economy seemed to favor natural jewels. In addition to the above, L. H. Kistler, Northwestern Electric Company, presented in summary form the new developments put into effect during the year by eight manufacturers and the new methods and practices adopted by four operating companies.

With a view to determining the feasibility of conducting a short course for meter men in the Northwest territory, Prof. R. H. Dearborn, Oregon State College, reported on the nature of such courses offered in other geographic divisions.

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Overhead Systems Committee

T. A. PURTON

Idaho Power Company, Chairman

A summary of the work of the committee keeping abreast of developments in the field covered by overhead systems was presented in a report by the chairman read in his absence by R. J. Davidson, Pacific Power & Light Company. Subjects being watched were maintenance work on live lines, pole treatment, trend of conditions affecting production use and cost of cedar, fir, and lodge pole pine poles, and the use of duralumin for truck bodies.

Recent practices in 110-kv. transmission construction and design were brought out in separate papers by T. H. Campbell, Stone & Webster Engineering Corporation, covering the Rock Island line; B. H. Aaron, Northwestern Electric Company, for the Ariel line; and D. R. McClung, Pacific Power & Light Company, for the Condit-Yakima line. All these lines are constructed with wood H-frame towers except the Columbia River crossing on the Rock Island line which will be on single circuit steel towers. Variations on the three lines in insulation protective equipment, conductors, sag and tension, guying and other minor features to meet differing conditions of weather, ground to be covered, and load requirements were brought out.

M. T. Crawford, Puget Sound Power & Light Company, presented a survey of practices of member companies in rural line construction, indicating that the majority of such lines were operating at 6 kv. and 11 kv. with 250- to 300-ft. spans of No. 6 copper on 35-ft. cedar poles. Some treated fir and pine poles were in use, and other variations from the above average had produced costs varying from $550 to $800 per mile, depending largely on different conditions to be met. Supplementing this report, D. F. Young, manager, Young Electric Company, Sherwood, Ore., presented data on cost and strength tests of 3 x 4 X-frame construction. Costs ran from $265 to $325 per mile, depending upon the number of supports used, while the strength test conducted by the Portland General Electric Company, of which the Young Electric Company is a subsidiary, showed results adequate to meet the loading conditions encountered in the territory in which most of this construction is used.

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Prime Movers Committee

C. C. SIMERAL

Portland General Electric Company, Chairman

A review of development in boilers and turbines and the general increase in efficiencies of steam units was presented by A. H. Greisser, Portland General Electric Company, to bring out the factors bearing on obsolescence. The paper showed how recent developments in over-all efficiency have forced plants built in comparatively recent years into stand-by and peak-hour service, but came to the conclusion that no fixed basis of depreciation could be set up accurately on this account. In one of the most spirited discussions of the meeting, the value of old steam plants for stand-by service was shown to offset, in many cases, the fact that such plants might be considered as obsolete from an efficiency standpoint.

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Underground Systems Committee

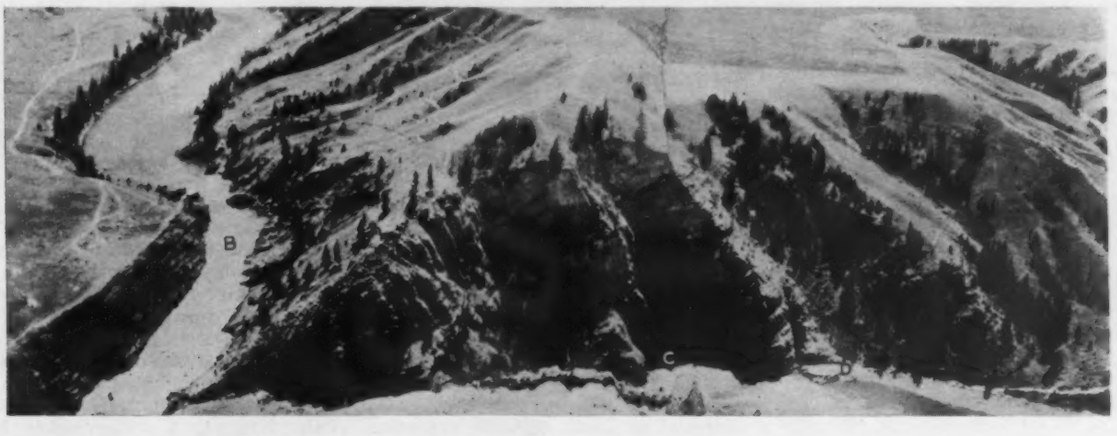
C. H. HOGE

Puget Sound Power & Light Company, Chairman

The latest practices in the manufacture and use of high-voltage underground cables were reviewed by F. E. Fisher, Puget Sound Power & Light Company. His conclusions were: (1) Three-conductor solid-type cable is practical for voltages not exceeding 44 kv.; (2) three-conductor oil-filled cables are practical in voltages up to 75 kv.; (3) single-conductor cables both solid and oil-filled are practical in voltages up to 132 kv. with experience favoring oil-filled; (4) shielded-type cables should be used; (5) great care should be exercised in the installation and operation of high-voltage cables. Discussion corroborated the facts brought out in the paper and indicated that the Northwest companies should have no hesitancy in making use of high-tension underground transmission when the economics of the case justifies it.

The economic study on which was based the decision of the Northwestern Electric Company to adopt an 11-kv. primary with 125-216-volt "Y" secondary underground system, different in some respects from any system now used, was told by S. B. Clark of that company. The system finally adopted was a modification of the radial feed with the network secondary—having duplicate primary arrangement for possible future conversion to a loop system with isolated network on the secondary. He showed by diagram the detail of the control and protection arrangement.

Flathead River Power Site in Montana



AIRPLANE view of the Flathead River five miles below the outlet of Flathead Lake in Montana, where the Rocky Mountain Power Company (Montana Power Company subsidiary) is now diverting the river through a 1,700-ft. tunnel from A (immediately above B) to D. Flathead Lake will be utilized as a regulating reservoir by means of a dam at B, 200 ft. high and 630 ft. long, including 400 ft. of overflow spillway.

Three 50,000-hp. units are to be installed in the power house to be built at C, which will operate under a head of 185 ft. when the lake is full.

Railroad connections to the dam and power house sites and construction plant and camps have been completed. Work on the diversion tunnel will be finished late in 1931.

Meetings

Coming Events

American Institute of Electrical Engineers—Annual Pacific Coast Convention, Lake Tahoe, Calif., Aug. 25-28, 1931.

International Association of Electrical Inspectors, Northwest Section—Sixth annual convention at Salem, Ore., Oct. 5-7, 1931.

Southwestern Section—Convention in San Francisco, Sept. 28-30, 1931.

National Electric Light Association—Fifty-fourth convention and exhibition, Atlantic City Auditorium and Convention Hall, Atlantic City, N. J., June 8-12, 1931.

Rocky Mountain Division—Annual convention at Stanley Hotel, Estes Park, Colo., Sept. 2-4, 1931.

National Electrical Wholesalers Association, Pacific Division—Thrice yearly meeting, Hotel Del Monte, Del Monte, Calif., May 7-9, 1931.

Pacific Coast Electrical Association—Annual convention at Hotel Del Monte, Del Monte, Calif., June 24-26, 1931.

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C.R.E.A. Budgets for New Projects

Six projects and a continuation of the rural electric short course were determined upon as a result of an all-day session of the California Committee on the Relation of Electricity to Agriculture, meeting in Fresno, April 8, 1931. Several other projects on which work had been started last year were to be either finished or further studies made on them without necessity for attention in the budget. Two new projects are among those budgeted.

The first item on the new list is the continuation of the study of soil heating. The study is to be extended to plants other than cucumbers, among which are other vegetables, and especially flowers. A new project is planned, one to investigate the effect of ultra-violet light from commercial sources of equipment in poultry treating. Next, an intricate study of the air conditions, humidity, temperature and food requirements of chicks for purposes of determining electric brooder practice is to be made.

So promising have been some of the electrical sterilization of fruit juice experiments that the work is to be continued and to be extended to other electrolytes for solutions. Likewise the study of effect of light on insects is to be continued. A new project is the study of mobile applications of electricity to farm production and field operation.

Other experiments, begun previously, which will be continued, include the further study of the effect of power interruptions on incubating eggs; walnut dehydration, which will be carried on, it is hoped, with the aid of the walnut association; and the general farm utility refrigerator, which is now on field test on a farm.

Dr. E. A. White, national director of the C.R.E.A., spoke at the noon luncheon. He spoke of tendencies in science, business, and agriculture which would lead to some broad predictions of possible basic revolutions in the farming industry within the next few years.

These, briefly, portend possible changes as follows: (1) Land farmed will be in smaller, richer areas, the marginal lands going back to grazing or timber; (2) animal power will be entirely replaced by mechanical power; (3) the percentage of population necessary to produce the total farm produce will be less; (4) farming will change from land owning to land operating, with a change in the type of people needed to operate efficiently; (5) dependence on animals for food or products such as butter may have to give way to chemical substitutes, laboratory produced; (6) smaller animals will occupy a more important place in food supply; (7) new crops will be developed; cotton, for instance, requires too much manual labor, hence the need for fiber or celulose materials will probably be met better by other crops; (8) through study of animal metabolism new grasses may be sought and developed for forage purposes.

Of two things alone, Dr. White said, could there be certainty. These are that the farmer must meet the problem of cheap food supply, and that change is constant and inevitable.

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Colorado League Holds Statewide Conference

More than 200 electrical dealers, Electragists, contractors, and central station members, some from New Mexico and Wyoming, attended the sixth annual statewide conference of the Electrical League of Colorado at Denver, April 22.

G. B. Buck, general commercial manager of Public Service Company of Colorado, advocated closer relationship between central station operators and electrical dealers in an address, "If I Were King," at the morning session. In round-table discussion, W. S. Boyd, secretary-treasurer, Western Section, International Association of Electrical Inspectors, described methods employed to eliminate sub-standard wiring installations in municipalities, made suggestions to local dealers and contractors.

G. Meredith Mysick, past president, Rocky Mountain chapter, American Institute of Architects, presented "The Architect's Viewpoint" on wiring and electrical appliances at the afternoon session. He was followed by L. A. Vosmer of the Queen City Electric Company on "Adequate Wiring." "The Manufacturer's, Wholesaler's and Power Company's Place in the Picture" was discussed by R. S. Harris, General Cable Corporation, E. L. Garihan, Mine and Smelter Supply Company, and F. G. McCammon, Public Service Company of Colorado.

James M. Eakins, chairman, Denver Refrigeration Bureau, spoke on "One Million Electric Refrigerators in 1931," indicating sales and advertising methods to promote this gigantic budget.

R. G. Gentry, vice-president of the Electrical League of Colorado, presided at the morning and afternoon sessions in the absence of L. M. Cargo, president. Frank R. Jamison, publicity director for Public Service Company of Colorado, was master of ceremonies at the banquet and elaborate "International Revue," which ended the day's activities.

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F. T. Griffith Re-elected President of Pepco

At the annual meeting in Portland, Ore., March 27, of the directors of the Pacific Northwest Public Service Company and of the Portland General Electric Company, a subsidiary, Franklin T. Griffith was re-elected president of both companies for his nineteenth term in this position with these and predecessor companies. Other local officers of both companies were named as follows: Vice-presidents, O. B. Coldwell and W. H. Lines; secretary and assistant treasurer, R. W. Shepherd. A. E. Peirce, of Chicago, was re-elected chairman of the board of the Pacific Northwest Public Service Company.

The only change in the directorate of the Pacific Northwest Public Service Company made at a meeting of stockholders held earlier in the week was the election of R. W. Shepherd to fill the place vacated by the death of C. N. Huggins.

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P.C.L.B. Dinner Meeting—Representatives of manufacturers, power companies, wholesalers, and contractor-dealers have been urged by the Pacific Coast Electrical Bureau to attend a "get-together" dinner meeting in Los Angeles on May 1, which will follow a meeting on that date of the board of directors of the bureau. The meeting is scheduled for 6:30 p.m. in the banquet room of the Los Angeles Chamber of Commerce Building. Each of the directors of the bureau has been asked to make a brief talk outlining the particular activity which he represents in the bureau.

Western Music and Radio Trades Association will hold its eighth annual convention in Vancouver, B. C., July 7-10, 1931. Convention headquarters will be at the Hotel Vancouver, and a radio show will be held on the sixth floor of the Hudson's Bay Company's department store, which the company has donated for that purpose. The show will be confined strictly to the trade and will not be open to the general public.

Personals

J. F. McLaughlin Long in Power Company Field

THE new president of the Puget Sound Power & Light Company, J. F. McLaughlin, who comes to the Northwest after fifteen years' service with various electric utility companies in the Southern states, has spent his entire business career in the power company field. Born on a farm in Massachusetts, he subsequently received his high school education at Hingham, Mass., and was then employed by an electric company serving Woonsocket and Pawtaucket, R. I. During this time he took special business and technical courses at Brown University, and eventually became assistant to the manager of the company.

Shortly before the outbreak of the World War, Mr. McLaughlin was sent to Beaumont, Texas, to assist in reorganizing the Eastern Texas Electric Company. He served overseas and returned in 1919 as a captain in the Air Service. Then, following a short period in the Texas district office of his former company, he was made superintendent of light and power of the El Paso Electric Company and later manager of the Baton Rouge (La.) Electric Company.

When Engineers Public Service Company acquired the Virginia Electric & Power Company in 1925, Mr. McLaughlin was made vice-president in charge of the Norfolk division. He was later appointed operating vice-president at Richmond. From there he was called back to Texas as district manager in charge of all of the Texas, Louisiana, and New Mexico properties. While serving in this capacity he was elected president of the Virginia Electric and Power Company and from there he was made operating executive of Stone & Webster Service Corporation, having charge of the operation of twenty utility companies in Virgina, Carolina, Nebraska, Missouri, Kansas, Texas, New Mexico, Louisiana, and Mexico.

Mr. McLaughlin has always taken an active and prominent part in the civic life of the cities to which his work has taken him. While in El Paso he was president of the Toltec Club and of the Country Club, and director of the Rotary Club. While in Norfolk he was president of the Industrial Commission and vice-president of the Chamber of Commerce as well as the Rotary Club.

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LLOYD JOHNSON, former merchandise manager of the Denver office of the Graybar Electric Company, has been promoted to branch house supervisor, with headquarters in Salt Lake City.

J. F. McLAUGHLIN

F. J. GANNON

R. M. MAXWELL

F. J. Gannon Goes to Tampa Electric Co.

F. J. GANNON, for the past year president of the El Paso Electric Company, El Paso, Texas, has been transferred to Tampa, Fla., to assume active management of the Tampa Electric Company, which carries on the entire electric light, power, street railway, and bus business in Tampa, in addition to electric light and power, water, and ice business in a number of smaller cities. Mr. Gannon joined the organization of the El Paso company in November, 1928, as manager, and later became president of the company. The Tampa company is under the executive management of the Stone & Webster Service Corporation, with which Mr. Gannon has been associated for 29 years.

Mr. Gannon went to El Paso from Florida, where he was vice-president of the company which established a fine record in constructing Davis Islands in Tampa Bay. Prior to that he was assistant treasurer of electric light and power, street railway, and other utility companies under Stone & Webster executive management at Dallas, Texas, Pawtucket, R. I., and Reno, Nev. From 1916 to 1926 Mr. Gannon held a similar position with the Northern Texas Traction Company, Ft. Worth. He is succeeded at El Paso by M. C. Smith, president of the Baton Rouge (La.) Electric Company.

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P.C.E.B. Southern Region Manager Appointed

R. M. MAXWELL, formerly resident engineer representing Curtis Lighting, Inc., of Chicago, in the Indiana and eastern Illinois territory, has been made manager in charge of the southern region of the Pacific Coast Electrical Bureau, with headquarters in Los Angeles. His offices are in the new building of the Southern California Edison Company Ltd., at Fifth St. and Grand Ave. His home is now in Hollywood.

N. W. Brockett Retires From Puget Sound Co.

THE retirement of Norwood W. Brockett, director of Public Relations of the Puget Sound Power & Light Company, after 29 years of service with the utility, was announced last month by J. F. McLaughlin, president of the company. Mr. Brockett's request for retirement was the result of a prolonged period of ill health.

The public relations department which Mr. Brockett headed will be abolished, it is announced. Instead of a separate public relations group, functioning under a manager, the heads of the firm's various departments will be held responsible for maintaining proper relations with the public.

Mr. Brockett entered the employ of the Snoqualmie Power Company in 1902 as a clerk in the legal department, and upon the consolidation of that company with the Stone & Webster interests in 1912, joined the staff of the present Puget Sound Power & Light Company. He served in the field artillery during the World War and was mustered out with the rank of captain. When he returned to Seattle he was made manager of the company's public relations department.

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J. L. BEEBE, formerly Northwestern representative for Trumbull Electric Manufacturing Company, with headquarters in Seattle, has been transferred to Oakland, Calif., where he has become a member of the sales force of the Pacific Division of the Trumbull company.

W. D. SHANNON, Seattle, general manager of the Stone & Webster Engineering Corporation in the Pacific Northwest, recently returned from a 4,000-mile tour of the Pacific Coast.

H. S. SANDS, consulting electrical engineer, has been re-elected for the third time as president of the Denver Chamber of Commerce.

ROME C. SAUNDERS

A. M. CHITTY

Changes in Puget Sound District Offices

PROMOTION of Rome C. Saunders to the executive office of the Puget Sound Power & Light Company at Seattle has brought resulting changes in the managership of two district offices of the company. A. M. Chitty succeeds Mr. Saunders as the company's southwestern district manager, with headquarters at Tacoma, and Mr. Chitty has, in turn, been succeeded as southern district manager at Chehalis, Wash., by Lionel J. Bourke, as announced last month in ELECTRICAL WEST.

Mr. Saunders has been continuously employed by companies under Stone & Webster management since 1909. He came to Tacoma in 1913 as commercial agent for the Tacoma Railway & Power Company, Puget Sound Electric Railway and Puget Sound Traction, Light and Power Company, later being made sales manager of these companies. He was appointed manager of the Puget Sound company's southwestern district in 1929, remaining there until his present assignment to the Seattle office.

Mr. Chitty had been manager of the southern district of the company for the past five years, and before that had served in the northeastern dstrict. Before coming to the Pacific Coast he had been connected with the Ottawa Electric Railway Company and with the Westinghouse Electric & Manufacturing Company's Canadian representative, Ahern & Soper.

The promotion of good roads was a major activity of Mr. Chitty while in Chehalis. He acted as Lewis County representative in the Southwest Washington Good Roads Association, and was an energetic worker for the White Pass highway. He was trustee of the Chehalis Golf and Country Club, an Elk, and past president of the Chehalis Rotary Club. He is also a member of the American Institute of Electrical Engineers.

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RICHARD E. SMITH, advertising manager of the Southern California Edison Company Ltd., made a brief business trip to San Francisco in April.

HAROLD J. MERILEES, formerly of the advertising department of David Spencer, Ltd., Vancouver, B. C., has now joined the publicity department of the B. C. Electric Railway Company. Mr. Merilees will be in charge of all the merchandising advertising of that company, under the direction of James Lightbody, publicity director. Mr. Merilees succeeds Fred H. Beck, resigned.

A. E. GRISWOLD, of Seattle, president of the Trumbull Electric & Manufacturing Company, Pacific Division, visited San Francisco last month. He attended a meeting of the San Francisco Electrical Development League on April 20. Mr. Griswold has supervision of the Trumbull factories in both Seattle and Los Angeles.

W. R. FOSTER, for the past fifteen years in charge of the power system warehouse for the Los Angeles Department of Water and Power, has been appointed general storekeeper for the department. All of the department's district warehouses, of which there are nineteen, and stores, including salvage, will be under the direction of Mr. Foster.

JESSE J. MITCHELL, formerly branch manager at Indianapolis, St. Louis and Cleveland, and later assistant sales manager in Detroit, in charge of panelboard sales for the Square D Company, has been added to the sales staff at the San Francisco factory of the Diamond Electrical Manufacturing Company, Ltd.

C. M. MCDONALD, of the Intermountain Electric Company, Salt Lake City, was elected president of the Mountain States Music and Radio Trades Association at a meeting held in Salt Lake City recently. He succeeds Robert Nevins. J. C. Dwyer, of the Standard Furniture Company, was elected vice-president, and V. P. Felt, of the Felt Radio Company, treasurer.

W. H. MCGRATH, vice-president of the Puget Sound Power & Light Company, Seattle, recently returned to Seattle after a vacation trip in southern California.

A. W. LEONARD, former president and now chairman of the board of directors of the Puget Sound Power & Light Company, has announced that after a trip lasting several months he will continue to make his home in Seattle, where he has resided for the past eighteen years.

CLAUDE R. LESTER has been appointed chief of the new Oregon public service commission engineering department by Charles M. Thomas, commissioner of public utilities. Mr. Lester had served in this capacity with the old public service commission.

DR. ROBERT J. WISEMAN, chief engineer of The Okonite Company, New York, visited Pacific Coast offices of the company during April.

TOM GRAY, district manager for Public Service Company of Colorado at Alamosa, has been transferred to Fort Collins, where he becomes manager of the organization's entire northern Colorado district. He succeeds to the position left vacant by the recent death of Lawrence W. Cody. H. Hugh Lenhart, new business manager for Public Service Company at Grand Junction, Colo., takes over the duties formerly discharged by Mr. Gray at Alamosa.

Obituary

LAWRENCE W. CODY, district manager at Fort Collins for Public Service Company of Colorado, died April 8 after an illness extending over more than a year, ending his career as a utility official in the same organization with which he started 25 years ago. Mr. Cody went to Denver from St. Louis, Mo., in 1906, affiliating with the old Denver Gas & Electric Company (now Public Service Company of Colorado).

P. L. HOADLEY, of the Hoadley-Brooks Company, electrical manufacturers' agents of Seattle, died at his home in that city on March 27 following a brief illness. Mr. Hoadley was formerly identified with the Westinghouse Electric & Manufacturing Company in Seattle, and for the past six years had been executive secretary of the Electric Club of Seattle.

CHARLES E. DAY, securities representative of the Puget Sound Power & Light Company in the Chehalis (Wash.) district for nine years, died in that city on April 9, after a brief illness.

FRED GREISBERG, for many years estimator for the Decker Electrical Construction Company, San Francisco, died of heart failure on April 15 in that city.

Contractor Dealer Inspector

Named President of Inspectors Association

R. H. Manahan, chief of the Department of Electricity, City of Los Angeles, and long active in the affairs of the International Association of Electrical Inspectors, was named national president of that organization at a recent meeting of the executive board

R. H. MANAHAN

of the association held in New York City previous to the meeting of the Electrical Committee of the N.F.P.A. for 1931 code revision.

Mr. Manahan has been official representative of the Southwestern Section of the I.A.E.I. on the Electrical Committee several times and was once elected president of the Southwestern Section. He resigned in favor of Harry Beecher, chief inspector in his department at that time.

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Trade Practice Rules Presented Commission

The high points in the March meeting of the national executive committee of the Electragists from the United States and Canada, in Kansas City, Mo., came with the Trade Practice Conference of the electrical contracting industry, under the auspices of the Federal Trade Commission. Judge George McCorkle, legal counselor for the commission, presided.

Twenty-three resolutions were adopted and submitted to the commission for approval as trade practice rules. The conference also created a committee on trade practices empowered "to make complaints concerning alleged violations, to co-operate with the Federal Trade Commission, and generally to perform such other acts as may be reasonably necessary and proper to put the resolution into effect and accomplish the objects and purposes of the conference."

The following members of this committee were appointed, these four to select the fifth member: L. K. Comstock, New York; L. E. Mayer, Chicago; E. D. Brown, Detroit; J. A. Fowler, Memphis.

Clyde Chamblin, San Francisco, representing the Pacific Division, and R. R. Reid, Salt Lake City, representing the Mountain Division on the executive committee, attended and reported many other items of business consummated by the delegates. Some 3,300 copies of "Electragists' Standard for Wiring Installations," defining what this organization considers best practices in wiring, were sent to the leading architects throughout the country. With each booklet was sent a membership list of the A.E.I., providing the architect with a source of reference for the selection of responsible, competent electrical contractors for their work.

When it was reported that the Department of the Treasury is not favorable to the publication of the mechanical work separately from the general contracts on government buildings, it was voted by the executive committee to ask the federal government to call for sub-bids on the mechanical work on all government projects directly from the mechanical trades, and to select the low bidders and give the names and amounts of their bids to the general contractor for inclusion in his general contract.

Also important was a resolution passed by the association withdrawing its signature from the declaration of merchandising principles, drawn by the Joint Merchandising Conference during 1928-29, because the association was not asked to participate in a new conference, recently initiated.

Still another important resolution adopted by the executive committee was that against free wiring. The resolution takes cognizance of the fact that certain power companies have offered premiums to encourage the buying of electrical appliances sold by them, and that consideration is now being given to plans whereby companies may absorb the cost of wiring and charge this cost to promotional expense. The resolution charges that free wiring offered on heavy-duty appliances seriously reacts against the normal relations of contractors with their customers where proper charges must be made for wiring; holds that "installed complete" prices quoted to customers should cover adequate margins for both the device and the wiring; that the giving of premiums or the absorption of installation expense is a form of price cutting; that the practice jeopardizes friendly intra-trade relationship; and that such practices are in reality a substitute for intelligent salesmanship.

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CAMP & FRENCH, contracting engineers of Sacramento, Calif., have secured the services of H. F. Jerauld who will have charge of irrigation and drainage services. Mr. Jerauld has had a number of years' experience in handling water problems in the Sacramento Valley.

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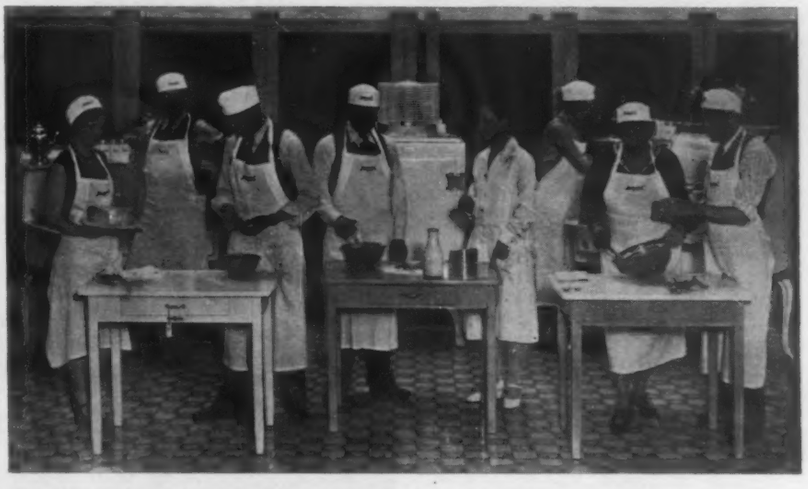
Long Beach Dealers Conduct Own Cooking School



LONG BEACH (Calif.) housewives were treated to a one-day cooking school as guests of the California Electragists and the Merchant-Dealers' Association recently. Nine local firms participated in the school and lent necessary equipment.

The demonstration followed a special two weeks' class for dealers and salesmen under the auspices of the association, which has assumed responsibility for the merchandising activities of the Southern California Edison Company in the Long Beach territory. Mrs. Ethel Goodin, home economist for the Hotpoint company, was in charge and was assisted by J. Campbell Hoyt, of the Edison company.

From left to right, these cooking school enthusiasts are: Miss Catherine Lossing; R. A. Antle; L. O. Wetzel, president, Long Beach Electragists; F. J. Connolly, secretary, California Electragists; Mrs. Ethel Goodin, Hotpoint economist; Mrs. Ella Wetzel; Miss Margaret Houser; and A. F. Boylan.

Tacoma Dealers Protest Municipality Selling

Whether the City Light Department of Tacoma shall go out of the business of selling electric ranges, water heaters, and other appliances, has been up in debate before the city council of Tacoma and is still undecided at the time of going to press. This debate has been public and has included representatives of the Chamber of Commerce and retail merchants who seek to have the city withdraw from competition with them.

Superintendent of Light Department Llewellyn Evans submitted figures to show that of 684 ranges sold in Tacoma last year, 383 were sold by the city, against about 300 by retail merchants, including 169 sold to apartment houses direct by manufacturers. The city did a business of $78,542 in appliances in 1930, it was shown.

Homer King, spokesman for the merchants, claims that the city handled only "the cream of the business," and therefore made a better showing than if required to handle all lines. City controller figures showed that the city's appliance department made a profit in 1926, 1927, and 1928, but lost enough to offset these profits in 1929 and 1930.

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Southern Electragists Hold One-Day Meeting

A one-day spring convention was planned by the Southern Chapter, California Electragists, for May 1, according to announcement sent out by Frank Connolly, executive secretary. This convention takes the place of the usual spring excursion to Ensenada, Mexico, by boat, during which the convention meetings are usually held.

The meeting is to be held at the Alexandria Hotel, Los Angeles, between 9:30 a.m. and 4:30 p.m. That evening the entire electrical industry in Los Angeles and southern California is to gather under the auspices of the Pacific Coast Electrical Bureau at the Chamber of Commerce Building. Glenn Arbogast, president of the California Electragists and southern regional chairman of the bureau, will preside.

Subjects discussed will be reported in the next issue of ELECTRICAL WEST.

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COMMANDING A VIEW at the entrance of San Diego, the Junipero Serra Museum, situated on the site of the first mission in California, was floodlighted recently by the Airport Electric Company, of San Diego. The equipment consists of five 500-watt floodlights mounted on iron standards cast in concrete and served by means of lead cables. Each of the standards is concealed in the shrubbery and the entire job is made weatherproof so that the water sprinkler system for irrigation of the grounds cannot harm it. The museum was built by George W. Marston and the lighting was contributed by Havrah Hubbard.

FLYNN'S ELECTRIC COMPANY, Santa Barbara, Calif., recently moved to its new building. Enlarged quarters were needed because of increased business. The change will also provide for an expansion program, the first move toward which is the acquisition of a more complete line of fixtures, on which the company will concentrate for the present.

T. E. WEBB ELECTRIC COMPANY is the name of a new concern which has been established by T. E. Webb at Altadena, Calif. The store will specialize in electric fixtures. Mr. Webb formerly operated a shop on Colorado Blvd., Pasadena, under the name of Webb Lubens Electric Company.

ENTERPRISE ELECTRICAL WORKS, San Francisco, has placed W. D. Kann, formerly with the Gardiner Electrical Manufacturing Company, Oakland, in charge of its transformer department.

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New Charter Helps San Francisco Chief

Members of the I.A.E.I. and particularly friends of Ralph W. Wiley, president of the Southwestern Section, and chief of the Department of Electricity of San Francisco, will be pleased to learn of his advancement in office under the provisions of the new charter recently adopted by the City and County of San Francisco. Under the old charter the electrical department was supervised by various boards and commissions having conflicting and indefinite jurisdiction. Under the new charter, the Department of Electricity now stands alone and full responsibility for the operation of the department is vested in the chief.

Civil service rating is automatically extended to Mr. Wiley under the new charter and he will report only to the city's chief administrative officer.

Commercial and Motor Wiring Firms Merge

Merger of the Quality Electric Company and the California Electric Company into a large organization to be known as the California Electric Company, Ltd., gives Oakland, Calif., one of the leading independent organizations of its kind on the Pacific Coast. Stanley S. Rice is president of the new merger; C. D. Bronson is vice-president; and J. C. Morello is secretary-treasurer. Rice founded the Quality Electric Company twelve years ago in Oakland; the California Electric Company was organized in that city 45 years ago. The headquarters of the new organization will be at the former Quality Electric Company shop at 115 Twelfth St.

The company's shop contains 10,000 sq.ft. of floor space and represents an investment of nearly $100,000. Fifty mechanics are employed in the firm's activities, which include a complete electrical service for commercial and industrial establishments, specializing in rewinding and redesigning of motors of every type and size, ranging in capacity from ¼ to 3,000 hp. In addition to the rewinding and redesigning, the new company will manufacture all types and sizes of armature coils.

For its field of operation the company covers all of northern and central California, the Pacific Northwest, Idaho, Nevada, and Utah.

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I.A.E.I. SECRETARY TOUSLEY announces that a yearbook of the association will soon be off the press and ready for distribution.

ELECTRICAL work on the new St. Louis College Building, now being erected at Victoria, B. C., will be done by the Victoria firm of Hawkins & Hayward.

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Pacific Electric Motor Show Draws Crowds

Crowd at the motor show held by the Pacific Electric Motor Company, Oakland, described in the April number of ELECTRICAL WEST. *Door prizes were being awarded to some of the 425 guests who attended the display in this modernized shop*

Manufacturer Distributor

Armstrong Appliances to Be Pushed on Coast

Establishment of a district office and warehouse in San Francisco at 140 Spear St. by The Armstrong Appliance Corporation, Huntington, W. Va., formerly The Armstrong Electric & Manufacturing Corporation, was announced last month following a reorganization of the company. Samuel H. Taylor, formerly secretary of the Pacific Coast Electrical Association, is in charge as

SAMUEL H. TAYLOR

district manager, his territory embracing northern California, Nevada, Oregon, and Washington. J. B. Swan is district manager in the southern California and Arizona territory, with headquarters at Los Angeles.

The Armstrong corporation will undertake an active sales campaign on the Pacific Coast on ranges, table appliances, and hardware specialties.

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BULL DOG ELECTRIC PRODUCTS COMPANY, Detroit, has announced the appointment of Safety Switchboard & Manufacturing Company, 960 Howard St., San Francisco, as exclusive representative and manufacturer of Bull Dog products in northern California and northern Nevada. J. C. Lanahan is president and general manager of Safety Switchboard. Mullenbach Electrical Manufacturing Company, 116 East Sixteenth St., Los Angeles, will represent the Bull Dog company similarly in southern California, Arizona, and southern Nevada.

STERLING ELECTRIC MOTORS, Los Angeles, has announced the appointment of John R. Howell as sales manager. Mr. Howell has been a member of the sales organization for some time. The company also has announced the recent establishment of distributors in New York, Philadelphia, Boston, Pittsburgh, Cleveland, Denver, and Houston. It already has distributors in Spokane, Seattle, Portland, Phoenix, Salt Lake City, El Paso, and Milwaukee.

CLARK CONTROLLER COMPANY APPOINTS NORTHWEST AGENT—Burton R. Stare, of Seattle, has been appointed Northwest representative by Clark Controller Company, of Cleveland, Ohio, and Sundh Electric Company, Newark, N. J. The Sundh company now is owned and operated by the Clark Controller Company. The Demmert Company, of Los Angeles, represents both companies in southern California and Arizona; Oliver B. Lyman, of San Francisco, is northern California representative.

OSCAR A. SCHLESINGER has joined the San Francisco organization of the Electric Materials Company, Inc. He is also in charge of distribution in the San Francisco Bay territory of a radio made in Los Angeles to sell in quantities to dealers who market it under their own name. Mr. Schlesinger was formerly associated with the Square D Company and the Western Electric Company.

GILLETTE & MCLAREN, INC., manufacturers' representatives, have moved their Seattle establishment from 320 Occidental Ave. to 408-409 Mutual Life Building, Pioneer Square. The Portland office continues at 53 Fourth St.

Anaconda Buys Cable Accessories Corp.

Business and assets of the Cable Accessories Corporation, formerly of Pittsburgh, Pa., were recently acquired by Anaconda Wire & Cable Company, of New York.

The Anaconda company has moved to a new plant at Hastings-on-Hudson, N. Y., where a full line of outdoor and indoor terminals, potheads, junction boxes, jointing materials, insulating compounds, and duct recording thermometers is being manufactured.

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TO DISTRIBUTE ICE-O-MATIC REFRIGERATOR—Leon J. Robinson, factory field sales manager for California, Arizona, and Nevada for the Williams Oil-O-Matic Heating Corporation, Bloomington, Ill., has announced the appointment of Foy & Krause, 1616 South Figueroa St., Los Angeles, as southern California distributor of the Ice-O-Matic refrigerator.

EUGENE BRAUN, assistant manager, Maydwell & Hartzell, Inc., recently returned to San Francisco from a week's inspection visit at the new Seattle office and warehouse of Maydwell & Hartzell.

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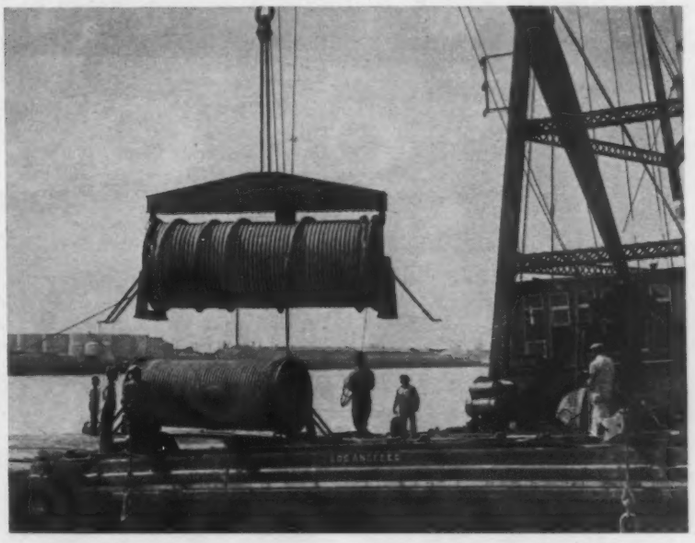
Okonite Company Supplies 112-Ton Cable Order



A SHIPMENT of 112 tons of 4-in., three-conductor, steel-armored submarine cable was received last month by the Southern California Edison Company Ltd. from The Okonite Company, of Passaic, N. J. The cable will be laid in Cerritos Channel to supply electrical service from the Edison Long Beach steam station on Terminal Island to the Proctor and Gamble soap plant on the Long Beach mainland. The initial requirement of the soap plant will be 5,000 hp., to be delivered to three substations now being built.

A five-car train, four cars for the reels of cable and a fifth for special lifting apparatus, was required to ship the cable by rail to Los Angeles harbor. Each reel of cable, 2,700 ft. to the reel, weighed 28 tons. The reels are shown being lifted from the cars to the barge from which the cable will be laid. A crane barge was utilized for the lifting operation.

The four cables, providing twelve circuits, will be laid simultaneously in a back-filled trench to be dredged 10 ft. below the present channel bottom. Six circuits will serve the Proctor and Gamble substations and six others will be utilized when extra facilities for service are required by other industrial establishments in the Long Beach harbor area.

H. J. SNYDERMAN COMPANY, manufacturers' representative, has announced the removal of its San Francisco offices to larger quarters at 271 Seventh St., between Howard and Folsom Sts. The company maintains branches in Seattle at 312 Commercial Building, and in Los Angeles at 340 East Fourth St. Among the companies represented are the Electric Clock Corporation of America, United States Electrical Manufacturing Corporation, Poloron Electric Manufacturing Company, Ohio Art Company, and the Real Lite Company, Ltd.

TO DISTRIBUTE BLACK & DECKER TOOLS—The Quality Electric Company, Ltd., 812 South San Pedro St., Los Angeles, has been appointed by the Black & Decker Manufacturing Company, Towson, Md., as exclusive distributor in the southern California and Arizona territory of the Black & Decker line of heavy-duty grinding and buffing equipment and high-cycle super power production tools. The Quality Electric Company will function also as a service station for Black & Decker equipment.

PACIFIC ELECTRIC, LTD., 470 Granville St., Vancouver, was recently incorporated at Victoria, B. C., with capitalization placed at $10,000. Papers of incorporation describe the firm as agents for, distributors of, and dealers in electrical equipment of every description.

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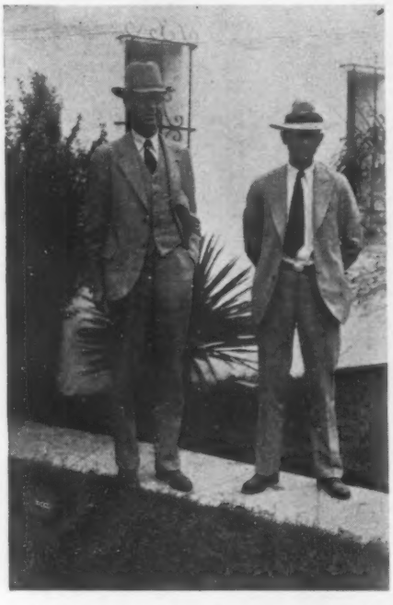
Southland Associates



Ralph Cunningham (left) of Farnham & Cunningham, manufacturers' representatives of Los Angeles, and C. Murvin, district superintendent of the Southern California Edison Company Ltd. at Alhambra. Mr. Cunningham's firm has moved to Room M-29 in the Edison company's new Los Angeles building

PACIFIC ELECTRIC TO SUPPLY BREAKER FOR ROCK ISLAND—Contract for furnishing a 115-kv. high-speed oil circuit breaker opening in eight cycles to the Stone & Webster Engineering Corporation for the Rock Island development of the Puget Sound Power & Light Company has been secured by the Pacific Electric Manufacturing Corporation. This is one of the first breakers of this type sold in the Pacific Northwest. The sale was made through the Boston office of Stone & Webster and delivery will be made about Sept. 15, according to Charles H. Cutter, manager of the Seattle office of the Pacific Electric corporation. The contract involves the expenditure of approximately $17,000.

W. W. KIRK, district manager for Delta-Star Electric Company, who has maintained sales rooms in the I. W. Hellman Building, Fourth and Spring Sts., Los Angeles, has moved into his new store and sales rooms at 415 Wall St. in that city.

A DEALER RELATIONS DIVISION has been established by The Hoover Company. This department's function is to maintain close contact between the field organization of the company with dealers and also between dealers and the head office at North Canton, Ohio.

THE GLOBE ELECTRIC COMPANY, 307 First Ave., South, Seattle, has taken over the stock and good will of the Burghardt & Hauff Electric Company, which is quitting the electrical field. This company started in Seattle about twenty years ago, as electrical contractors, later becoming jobbers. The Globe Electric Company was established in 1907. Dan Chamberlain is president, and George Reinger, secretary-treasurer.

JAMES R. KEARNEY, president, The James R. Kearney Corporation, St. Louis, Mo., spent a week during March in California, visiting the offices in San Francisco and Los Angeles, of Maydwell & Hartzell, Inc., distributors of Kearney products.

CARRIES WESTINGHOUSE APPLIANCES—Installation of the complete line of Westinghouse electrical household equipment and radio has been announced by Standard Mattress & Furniture, Inc., San Diego, Calif., through its president, Joseph E. Dryer. Heretofore the company has manufactured furniture for sale direct from its own showrooms and has carried no electrical appliances.

PHOENIX FRIGIDAIRE AGENCY MOVES—New headquarters of the Frigidaire agency were opened in Phoenix, Ariz., on April 3 by the O. W. Watkins Company at 1014 North Central Ave. Mr. Watkins stated that the agency in Phoenix had been taken over by his company on Jan. 1, and that the move from the former offices at 417 West Adams St. was occasioned by need for more space.

Sharples Specialty Co. Announces Promotions

The Sharples Specialty Company of California, San Francisco, announces the appointment of James H. Wilcox as general manager of the Pacific Coast branches of the company. Mr. Wilcox, who joined the company in 1924, has been manager of the Sharples branch in Los Angeles for the past five

JAMES H. WILCOX

years. He takes the place of W. L. Marston, who returns to the main office of the Sharples Specialty Company at Philadelphia, to become sales manager for the entire company.

Thomas J. Griffin, formerly assistant manager of the Pittsburgh branch, becomes manager of the Los Angeles Branch.

The Sharples company manufactures centrifuges used for the purification of transformer and switch oils and turbine lubricating oil.

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THE ELECTRIC CORPORATION, through its president, Ross Hartley, has announced the discontinuance of its branch in Seattle. The company will continue to operate its houses in Los Angeles, San Francisco, Oakland, and Portland.

SEATTLE CALLS FOR TRANSFORMER BIDS—William D. Freeman, Seattle city purchasing agent, has been instructed to issue a call for bids on 36 150-kva. and 24 11-kva. submersible type transformers and 80 smaller transformers ranging from 150 kva. down to 7½ kva. Specifications for $50,000 worth of subway transformers for use by the City of Seattle were recently approved by the Seattle Board of Public Works.

NORGE CORP. INCREASES SALES OUTLETS—Two Western distributors have been added to its sales organization by the Norge Corporation, Chicago. These are the Auto Equipment Company, Denver, and Strevell-Paterson Hardware Company, Salt Lake City.

ELECTRIC ENGINEERING LIMITED, 342 West Pender St., Vancouver, has been incorporated at Victoria, with capitalization set at $10,000. The firm carries on business as dealers in and manufacturers of electrical equipment and machinery of all kinds.

New Products

Thermador Heat-Fan

For quick warmth where auxiliary heating is desired, the Hoffman Specialty Company of California, Ltd., Los Angeles, has developed the Hoffman Thermador heat-fan in both portable and wall type models. The portable Thermador is equipped with a handle and footbase so that it may be placed wherever desired and used to distribute warm air quickly to every corner of the room, or as a hair dryer, clothes dryer, etc. It may also be used as a cooling and air circulating fan in warm weather. Although weighing only 7½ lb., the heater is ruggedly constructed, with statuary bronze wrinkle finish. It is operated by an induction type motor which does not cause radio interference. Retail price, $27.50.—ELECTRICAL WEST, May 1, 1931.

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Modern Range

Possessing grace and beauty of form, the L. & H. electric range No. 880 of the A. J. Lindemann & Hoverson Company, Milwaukee, Wis., is worthy of a place in the finest kitchen. Body, cooking top and inside of cooking top cover are porcelain enameled in Nile green, the body and inside of cover pebbled in white; on top surface is finished in marble porcelain enamel. Accessories include an appliance outlet, chromium plated towel rack, dish holders, and condiment set.

The 16 x 14 x 19-in. oven of this range is electrically welded and is heavily insulated with rock wool. A 15½ x 20½-in. warming compartment is heated by a 330-watt unit controlled by a toggle switch. Convenient service drawers in the range provide generous space for storing cooking utensils. Dial for the direct connected temperature control is on the front of the range. Automatic time control can be added if desired.

A special feature of this range is the master switch which automatically disconnects the surface units when the cover is down. Spiral coil surface units come in three sizes: 6, 7, and 8 in. Each unit has three heats. The range occupies a floor space of 41 x 29½ in.; its cooking surface is 20½ x 23 in.; total height 40 in. Retail price, $212.50.—ELECTRICAL WEST, May 1, 1931.

Vapor-proof Lighting Unit

A complete new line of heavy-duty vapor-proof equipment has been developed by the Ivanhoe Division of The Miller Company, Meriden, Conn. These units were designed to protect the lamp and electrical connections from smoke, dust, fumes, and vapors in industrial locations where the electrical equipment is subjected to severe conditions. This line of equipment is available in the bowl, angle, flat cone, dome and holder, and globe only types, for use with lamps for 150 to 500 watts. All metal parts are of aluminum or brass with the exception of the reflector, which is of steel porcelain enameled with acidproof enamel.—ELECTRICAL WEST, May 1, 1931.

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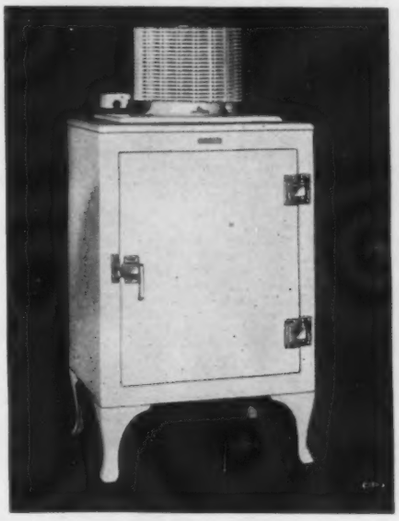
G. E. Refrigerator

The electric refrigeration department of the General Electric Company, Cleveland, Ohio, has announced a new domestic refrigerator model, the S-82, having 8 cu.ft. of food storage space and 13½ sq.ft. of shelf area.

A number of distinctly new features are included in this refrigerator. Sliding shelves have been provided, thereby making all parts of the cabinet equally accessible. In addition, these shelves are finished with a newly developed multi-plating process which makes them more resistant to corrosion than the usual tinned shelves.

A rubber tray is included as a standard accessory. This tray has stainless steel wires running along the bottom so that it is self supporting when filled with water and yet loses none of its flexibility. Two standard metal trays and one deep metal tray are also provided. These trays are equipped with covers and have new tapered metal dividers, making the removal of ice cubes exceptionally easy. The four trays hold a total of 12 lb. of ice, or 104 cubes. All hardware is chromium plated.—ELECTRICAL WEST, May 1, 1931.



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Sunlight Floor Lamp

A floor lamp whose light source is the sunlight S-1 Mazda lamp has been developed by the lighting research laboratory of the General Electric Company and is now being manufactured and sold by The Kayline Company, Cleveland. The illumination, being soft and diffused, makes it possible for one to read comfortably while obtaining the benefits of ultraviolet radiation.

The transformer, which is essential for the operation of the sunlight lamp, is located in the lower part of the standard. Two oxidized alumnium reflectors are concealed by the parchment shade. The upper one, being perforated, transmits a small amount of light to the interior of the shade and to the ceiling; the light and ultraviolet radiation which strikes the solid area is directed downward. The source is entirely concealed; the small reflector at the bottom of the lamp is so designed and of such a size that all direct rays from the sunlamp are reflected upward and redistributed from the upper reflector to the area underneath. The lower baffle plate or reflector can be taken off. Removal of this plate will reduce the time of exposure necessary to produce "sun-tan."—ELECTRICAL WEST, May 1, 1931.

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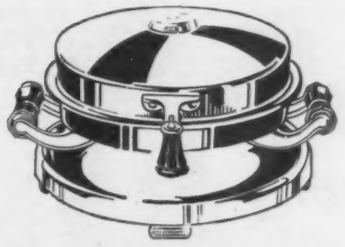
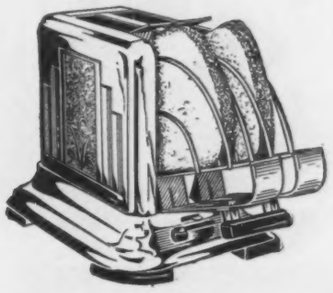
Cooking Appliances and Automatic Iron

Four additions have been made to the line of Star-Rite appliances manufactured by The Fitzgerald Manufacturing Company, Torrington, Conn.



All the guesswork is taken out of waffle baking by the heat indicator in the top of the Colonial waffle iron. The dial automatically registers the temperature of the grids, to tell the user when to pour the waffle batter. The finish of the waffle iron is chrome over copper and nickel plate. The wattage of the Colonial has been increased to 660, making it speedier in operation than former Star-Rite models. Retail price, $7.95.



A two-slice, chrome-finish automatic toaster is of the oven type. When the toast is done, the heat automatically shuts off, and by touching a handle the bread racks drop forward, placing the toast before the operator. The heating element of the toaster is "Chromel" ribbon, wound on mica. Retail price, $10.

In a fully guaranteed, automatic 6-lb. iron, chrome finished, any degree of heat between 275 and 550 deg. can be obtained by moving the cam lever on the top of the iron either forward or backward. Retail price, $5.—ELECTRICAL WEST, May 1, 1931.

Electric Water Kettle and Fruit Juice Extractor

Two new appliances recently added to the Universal family by Landers, Frary & Clark, New Britain, Conn., are an electric hot water kettle and a fruit juice extractor.

The three-quart kettle will boil a quart of water, starting at 60 deg. F., in 6 min. Thermostatic protection permits the kettle to boil dry wihtout injury to the unit.

The revolving ridged core of the fruit juice extractor instantly forces out the juice as the halved fruit is pressed down upon it. It scrapes the rinds dry of juice, and the coarse pulp is separated from the juice by a strainer in the bottom of the hopper bowl.—ELECTRICAL WEST, May 1, 1931.

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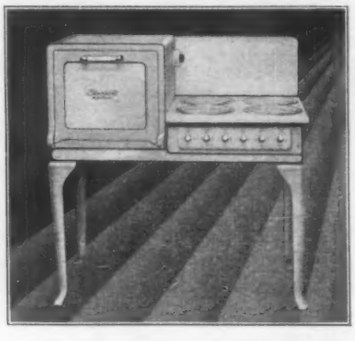
Popular Price Range



To retail at a popular price, the Standard Electric Stove Company, Toledo, Ohio, has recently introduced its Model 1336 electric range. This range has an aluminum lined, 16 x 14 x 18-in. oven, four full-sized hotplates, appliance receptacle, and oven temperature control with timer. Full porcelain enamel is used for the finish of the range, and right- or left-hand ovens are obtainable.—ELECTRICAL WEST, May 1, 1931.

Miniature Electric Cleaners

Sunshine junior and Sunshine duster are two new hand cleaners brought out by the Wise-McClung Corporation, New Philadelphia, Ohio.

Sunshine junior is built for speedy cleaning of upholstered furniture, drapes, mattresses, stair carpets, for moth control and deodorizing purposes, and other household uses. The Sunshine duster is especially designed for doing all the interior cleaning of closed automobiles. Nozzles of both cleaners are equipped with sanitizer and floating, self-adjusting brush; the duster model has in addition a 30-in. hose and swivel-jointed nozzle. The finish of the cleaners is polished aluminum; handles are of black rubber. Intended retail prices are $16.50 for the Sunshine junior and $19 for the auto duster.—ELECTRICAL WEST, May 1, 1931.

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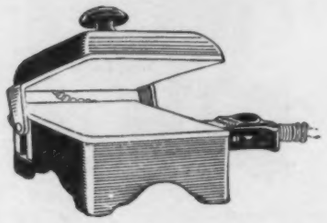
Pipe Threader

A pipe threading machine recently placed on the market by the Speedway Manufacturing Company, 1934 South 52nd Ave., Cicero, Ill., combines the advantages of a heavy-duty ¾-in.-capacity electric drill with those of a portable pipe threader. The drill may easily be taken from the pipe threading part by simply unscrewing two thumb screws. The Jacobs chuck on the drill firmly grips a steel shank protruding from a universal joint when the device is used as a power unit for threading pipe. This type No. 450 pipe threader may be used for pipe sizes up to and including 4 in. Retail price for pipe threader with drill, $190; pipe threader or drill only, $95.—ELECTRICAL WEST, May 1, 1931.

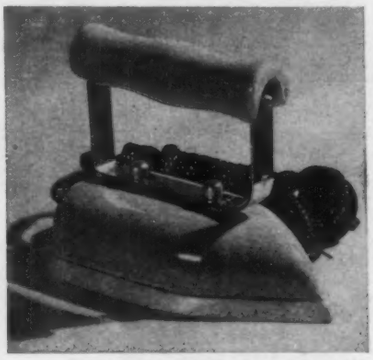
Sandwich Toaster and Lingerie Iron

An attractive table appliance in a choice of rich, pastel colors is a new Club toaster being marketed by the Holmes Distributing Company, 756 South Broadway, Los Angeles. The manufacturer is the West Coast Specialties Company, of Los Angeles.

Both sides of the bread are toasted at the same time in this toaster; it is adjustable to various thickness of sandwiches, and will also toast melba toast, buttered toast, dry toast, and French toast to a crisp, even brown. Durably made of cast aluminum, the toaster is finished in blue, yellow, green or black "Coorzite" porcelain. Retail price, $7.95.



A small electric iron for use when traveling is another West Coast Specialties Company product being distributed by the Holmes company. It is offered in the same assortment of pastel shades as the toaster and retails at $2.95.—ELECTRICAL WEST, May 1, 1931.



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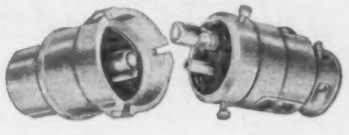
Individual Fushing Plug

For those cases where individual fusing of portable devices seems desirable, Crouse-Hinds Company, Syracuse, N. Y., has developed the type CPE fusible Arktite plug. This plug provides a fusible cutout that is always associated with a particular tool and that can be fused very closely to the capacity of the tool. List prices are $11 and $12.30.—ELECTRICAL WEST, May 1, 1931.



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GAS-FILLED MAZDA LAMP—Effective April 1, the General Electric 40-watt Mazda lamp, previously made only in the vacuum type, was changed to incorporate the gas-filled principle. The new lamp gives an average of 6 per cent more light throughout its rated life of 1,000 hours, and the light is whiter and of better quality. Its smaller bulb size permits its use in wall brackets now using 25-watt lamps.—ELECTRICAL WEST, May 1, 1931.

Tree Wire

A tree wire whose protection against wear by rubbing of tree limbs consists of an armor of material described as brake lining wrapped around the rubber compound insulation has been announced by The Okonite Company, Passaic, N. J. The trade name of the new product is "Okolast" and, because of the well known resistance of brake lining to the most severe abrasion, it has obvious advantages in tree service.

The outer covering of "Okolast" is an impregnated weave of hard-twisted seine twine, this particular form of cotton fabric being chosen because of its superior resistance to wear over the soft-spun-thread braids which commonly are used to absorb and hold impregnating compounds.—ELECTRICAL WEST, May 1, 1931.

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Underground Cable Boxes

The Delta-Star Electric Company, Chicago, has developed a line of low-voltage underground cable boxes with type "PB" terminators having mechanical entrances for use with lead-covered cables. The box pictured provides for the paralleling of six 1,000,000-circ.mil cables and has one 300,000-circ.mil tap. It is equipped with disconnecting links and fuses.—ELECTRICAL WEST, May 1, 1931.

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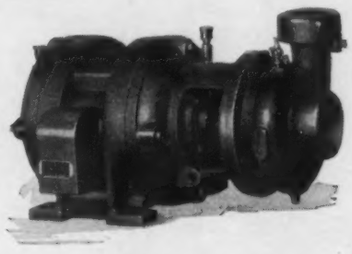
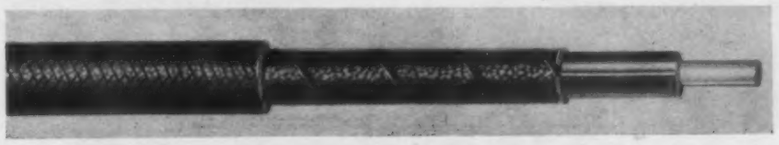


Pumping Units

Allis-Chalmers Manufacturing Company announces an extension to cover three new sizes in its line of "SSU" centrifugal pumping units of single-shaft, two-bearing design, which now includes ratings from 30 to 500 g.p.m. for heads under 100 ft. Recent adoption of total enclosure of motor housings on the pump end of these units permits their use under severe conditions.

"SSU" pumps are designed especially for heads heretofore not adequately covered by a low-price, guaranteed, high-grade pump. Some applications of "SSU" pumps are for water supply, circulation of water, oil or brine for heating or cooling systems; for transfer of many liquids; air conditioning; bottle washing and other washing machinery; garden or lawn watering; drainage system; swimming pools; dairies, or ice-cream plants; house service auxiliary to power equipment for cooling water seals, etc.—ELECTRICAL WEST, May 1, 1931.



Flexible Rigid Conduit

Rigid conduit whose smaller sizes can be bent across the knee without tools is the newest improvement in wiring construction materials announced by the merchandise department of the General Electric Company, Bridgeport, Conn.

The easy-bending quality of the new rigid conduit is the result of the development of a new kind of flexible alloy steel, now used in all General Electric rigid conduit in the sizes that are adapted to hand-bending. Its flexibility assures freedom from breaks that occur with more brittle types of conduit, and it threads more easily. —ELECTRICAL WEST, May 1, 1931.

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Trade Literature

¶ READY-MIXED CONCRETE PLANTS—Stephens-Adamson Manufacturing Company, Los Angeles, Calif., has just published a ten-page booklet describing its conveyors, elevators, hoppers, and batching equipment for central proportioning and concrete mixing plants. The book contains diagrams of typical plant arrangements and features a new automatic photoelectric cell control for increasing the accuracy and economy of concrete mixtures.

¶ OIL BURNERS—A revised edition of the manual entitled "New Facts on Oil Heating for Architects and Engineers" has been published by the Williams Oil-O-Matic Heating Corporation, Bloomington, Ill. Suggested oil burner specifications and regulations of the National Board of Fire Underwriters are included.

¶ CONNECTORS—Standard "Groundems" for making one unit of the various parts of a ground bus are described in a recent catalog addition of the Burndy Engineering Company, Inc., 230 East 45th St., New York.

¶ SWITCHES AND CONNECTORS—Descriptions of a new line of fuse and disconnecting switches, fuse links, and connectors are contained in a set of price sheets recently issued for addition to the catalog of the W. N. Matthews Corporation, St. Louis, Mo.

¶ CRANE CONTROL—Crane control equipment manufactured by The Electric Controller & Manufacturing Company, Cleveland, Ohio, is the subject of a newly published pamphlet entitled "Where Control Must Not Fail."

¶ STANDARD RANGE CATALOG—Catalog No. 31 of The Standard Electric Stove Company, Toledo, Ohio, describing the company's entire line of electric cooking equipment, including domestic ranges, commercial ranges, ovens, griddles, hotplates, water heaters, and coffee urns, is now being distributed.

¶ LIGHTING FIXTURES—Catalog No. 25, just issued by The Edwin F. Guth Company, St. Louis, Mo., contains descriptions of the complete line of lighting fixtures manufactured by this company for commercial, industrial, and special purposes.

¶ NEMA ELECTRICAL STANDARDS—Five booklets are now available from the National Electrical Manufacturers Association, 420 Lexington Ave., New York, as follows: "Handbook for Power Switchboard and Switching Equipment," $1; "Preferred Voltage Ratings for A.C. Systems and Equipment," 50 cents; "Panelboard and Distribution Board Standards," 50 cents; "Motor and Generator Standards," $1.50; and "Handbook of Radio Standards," $2. A special price of $4.25 for all five is offered; without the panelboard book, $3.85.

¶ DRY-TYPE TRANSFORMERS—A twelve-page, illustrated circular (No. 1886), covering dry-type transformers and auto-transformers, has recently been issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. In addition to descriptions of the application, operation, and construction of the various transformers, the booklet contains tables giving their ratings, style numbers, weights, and dimensions.

¶ THIN-WALL CONDUIT FITTINGS—In bulletin No. 901 the Appleton Electric Company, 1701 Wellington Ave., Chicago, lists and illustrates all types of malleable "Unilets," as well as couplings, connectors, clamps, etc., for use with threadless thin-wall conduit.

¶ METERING CATALOG—A second section of its catalog has just been issued by the Meter Devices Company, Canton, Ohio. In this supplement are described a line of metal meter test cabinets with metal back panels, meter test switches, a fuse holder for use in potential test leads, a simplified plug for use in jack circuits, and other devices.

¶ TERMINATORS—The Delta-Star Electric Company, Chicago, is distributing a new bulletin, No. 65-C, describing and listing multiple conductor terminators for sealing the ends of lead covered cables. Complete data are given on wet and dry flash-overs and tests showing critical and safe spacing under both 60 cycles and impulse tests. The bulletin covers equipment from 4.5 kv. to 30 kv.

¶ LEATHER BELTING—A treatise on leather belting, its manufacture, methods of use, proper care, etc., has been prepared by George B. Haven, professor of advanced machine design, and George W. Swett, professor of machine design, both of Massachusetts Institute of Technology, and published by the American Leather Belting Association. The book has 250 pages, 5 x 8 in., and is bound in stiff covers. It is being distributed by member companies of the association at $1.50 per copy.

¶ INDUSTRIAL CONTROL — High-voltage, high-interrupting-capacity circuit breaker and switchboard apparatus manufactured by Condit Electrical Manufacturing Corporation, Boston, Mass., for small industrial applications is listed and described in the corporation's recently issued catalog No. 5016.

¶ WESTINGHOUSE RANGES—A new catalog of its electric ranges has been issued by the Westinghouse company. Improved features that have been added to the company's type "C" ranges appear in this catalog No. 281.

¶ G.E. PUBLICATIONS—Recent publications of the General Electric Company, Schenectady, N. Y., include:

GEA-927B: Portable Recording Instruments for Alternating and Direct Current.

GEA-1333: Transformer-Oil Drier and Filter.

GEA-1363: CR9042 Form IG Resistor Units.

GEA-193A: Electrically Heated Gluepots.

GEA-1368: Vertical, Hollow-shaft Induction Motors for Deep-well Pumping.

GEA-1262A: CR9504 Thrustors.

GEA-1352: Squirrel-cage Induction Motors.

GEA-214B: Helicoil Sheath-wire Immersion Heaters.

GEA-1345: Type RDC Selective Balanced-current Relays for A.C. Circuits.

GEA-1379: Electric Heating Equipment for Glass-annealing Lehrs.

GES-686: Direct-current Motors.

GEA-1275: Fractional-horsepower Motors.

Barometer

WESTERN industrial operations in March continued at a level between that of February and that of January, according to reports of electric energy consumption. The index is 16 per cent above the December level and is approximatey the same as that for March, 1930. The slight recession from February in all probability is caused by late reading of the meters for the short month, thereby favoring February at the expense of March. The conclusion is to be drawn that activity increased decidedly from January to February and in March held at least at the February level.

In manufacture of food products the level is virtually that of February, 17 per cent higher than in January, and 34 per cent above March, 1930, and somewhat higher even than in 1929.

Forest products rose from preceding months approximately to last November's level, and above that of any previous March. Paper and pulp has for a number of months changed but slightly. Compared with 1930 the index is down 10 per cent; March was the high month last spring.

The more important downward movements were in chemicals (including oil refining), and in metals, which for five months have been far below former levels. In rubber manufacturing a decline from February to the January level still leaves the index above that for any other month since June and close to last year's March; in the stone, clay, and glass group the decline brings March slightly below last year, while February was above.

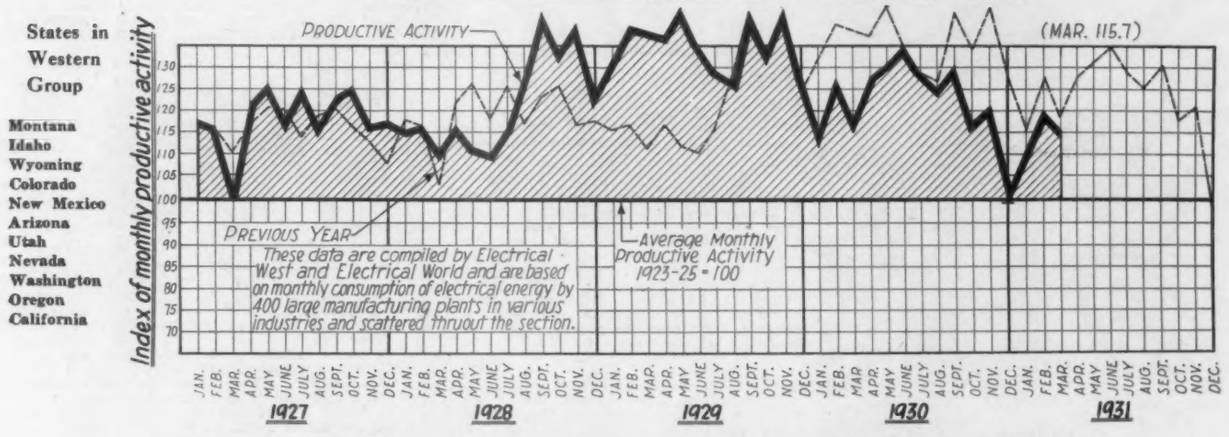
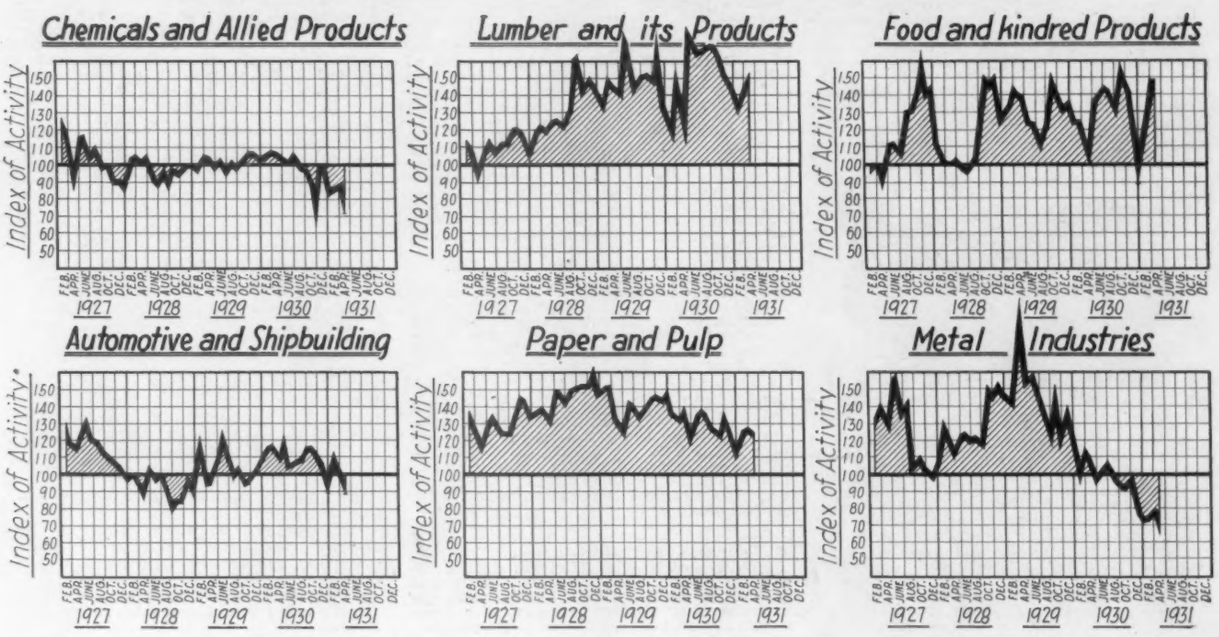
Indexes of Industrial Activity in the Western States

(All figures adjusted for number of working days)

	Mar. 1931	Feb. 1931	Mar. 1930	Average First Quarter 1931	Average First Quarter 1930
All industry	115.7	120.0	117.4	115.6	120.0
Chemical and allied products	71.8	85.7	108.8	79.9	108.7
Food and kindred products	148.4	149.3	110.6	141.2	120.6
Forest products	152.1	146.0	135.7	145.0	139.0
Metals group	64.1	74.4	109.5	70.0	106.8
Paper and pulp	125.3	128.3	140.0	126.5	135.9
Rubber and its products	155.0	173.0	160.8	161.7	166.3
Shipbuilding	88.7	.....	110.7	.....	115.1
Stone, clay and glass	94.9	106.0	99.4	98.2	100.3

General Productive Activity in the Western States

Adjusted for number of working days but not for seasonal variation



Productive Activity in the Primary Industries of the Western States